International Journal of Health and Medical Sciences
volume 7 pp. 20-24 doi: https://dx.doi.org/10.20469/ijhms.7.30004

Meta-Analysis: Relationship of Age, Gender, and Education Level with Medication Adherence of Hypertension Patients

Barlian *
Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia

Husaini
Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia

Izaak Zoelkarnain Akbar
Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia

Syamsul Arifin
Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia

Mohammad Isa
Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia

Abstract: Compliance of hypertension patients is an important factor that determines the success of the treatment program. Several studies show the low level of compliance of patients with hypertension. Socio demographic factors (age, gender, education level) are one of the factors that affect treatment compliance. Based on preliminary studies in several journals, there are inconsistencies or differences in research results on the variables of age, gender, and education level on treatment compliance of patients with hypertension. To analyze the relationship tendency between age, gender, education level with treatment compliance of hypertension patients. Meta-analysis by searching the databases of Google Scholar, Garuda, PubMed, Proquest. After going through the identification and selection stages, 18 articles were included in the meta-analysis. Pooled Odds Ratio (POR) was calculated using the random-effect and fixed-effect models for data analysis according to the heterogeneity test using Review Manager 5.4. The POR value for age variables was 1.03 (95% CI 1.01-1.04), gender 1.15 (95% CI 0.97-1.37), and education level 1.30 (95% CI 0.84-2.02). Age has a relationship with medication adherence with a small tendency, while gender and education level have no relationship with medication adherence in patients with hypertension.

Keywords: *Age, gender, education level, treatment compliance, hypertension*

Received: 20 October 2020; ***Accepted:*** 22 January 2021; ***Published:*** 24 March 2021

I. INTRODUCTION

Hypertension contributes to around 9.4 million deaths in the world every year [1]. There is a continuous increase in cases of hypertension in the world, with an estimate of 1.56 billion people until 2025. Likewise, in Indonesia, there was an increase in cases of 25.8% in 2013 to 34.1% in 2018 [2]. The results of [3] stated that the proportion of hypertensive patients based on the age group 18 to 64 years was 55.2%, and at the age of 65, there was an additional 14.3%. This shows that as age increases, the proportion of hypertension also increases.

Hypertension is a chronic disease that cannot be cured but can only be controlled and requires treatment in the long term and even for life. Patient compliance to treatment is an important factor in determining the success of hypertension treatment [4].

*Correspondence concerning this article should be addressed to Barlian, Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia. E-mail: barlianbudi@gmail.com

A publication released by WHO in 2003 entitled "adherence to long-term therapies" explained that medication adherence is influenced by sociodemographic factors (age, gender, education level, employment status, motivation, knowledge), health services, factors related to therapy (type of therapy and duration of therapy), patient's medical condition (degree of hypertension and presence of comorbidities) [5]. According to Green's theory, medication adherence is related to internal factors (predisposing factors), including patient factors, disease condition factors, and therapeutic factors, while external factors (enabling factors and reinforcing factors) include health care system factors and socioeconomic factors [6].

Regarding compliance behavior, age influences daily health practices through changes in mindset and behavior [7]. Meanwhile, the male gender has a risk of about 2.3 times more hypertension than women. According to Green's theory in [8], the level of education is one of the predisposing factors that influence a person's behavior. The higher a person's education, the easier it will be to receive information to improve the quality of life and increase the breadth of knowledge [9]. [5] show a relationship between age and education with medication adherence.

In line with the results of [10] research, [11] research shows a relationship between age, level of education, and adherence to hypertension treatment. In another study, [12] stated a relationship between age and gender on medication adherence of patients with hypertension. The results of [13] show a relationship between age and gender. On the other hand, there are several other research results, such as research by [14, 15, 16], which state that age, gender, and level of education are not related to adherence to treatment for hypertension patients.

Based on the previous studies above, there are inconsistencies or differences in research results on the variables of age, gender, and education level on medication adherence of hypertension patients. The existence of these differences in results will confuse future researchers in determining which results to follow. Therefore, it is considered important to conduct a meta-analysis study by combining several research results regarding the relationship between age, gender, and education level on medication adherence of patients with hypertension to determine the tendency of the relationship between these variables with medication adherence. Therefore new quantitative data will be obtained, with many subjects, and more definitive conclusions can be drawn.

II. METHOD

This type of research is a meta-analysis study where the researcher uses several similar research articles to combine so that new data is obtained and quantitative testing is carried out. In meta-analysis research, there is a term with effect size, namely the difference in the incidence of effects between the experimental and control groups, which will be carried out using statistical techniques. In this meta-analysis, an observational study was conducted to estimate the effect size, namely the strength of the relationship or the magnitude of the difference between variables. The protocol of this study uses the concept of Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA). The population in this study was national and international journals with 24,962 articles. The sample in this study amounted to 18 articles consisting of 1 national journal and 17 international journals.

III. RESULTS AND DISCUSSION

Eighteen research articles consist of 17 international journals indexed by Scopus and one national journal indexed by Sinta 4, using a cross-sectional design. The estimated effect size from the above studies is in the form of Odds Ratio (OR), which is taken from the results of multivariate analysis directly in the research article and calculated from the available data. Most research locations are from the Asian region such as Malaysia, Indonesia, Myanmar, Hong Kong, China, Saudi, Iran. In addition, from African regions such as Uganda, Nigeria, Ethiopia, Ghana, and one from Central Europe, Romania.

A. Meta-analysis of the Relationship between Age and Medication Adherence of Hypertensive Patients

Based on the heterogeneity test in 11 research articles that examined the age variable with a sample of 7233, it was obtained that the heterogeneity was quite high because the p-value = 0.003 and the I2 value = 63%, a random-effect model was used. The quite high heterogeneity obtained in the combined study could be due to differences in the population of the research subjects. The largest number of samples is found in [17], as many as 2445, and the smallest number of samples is 204 in [13].

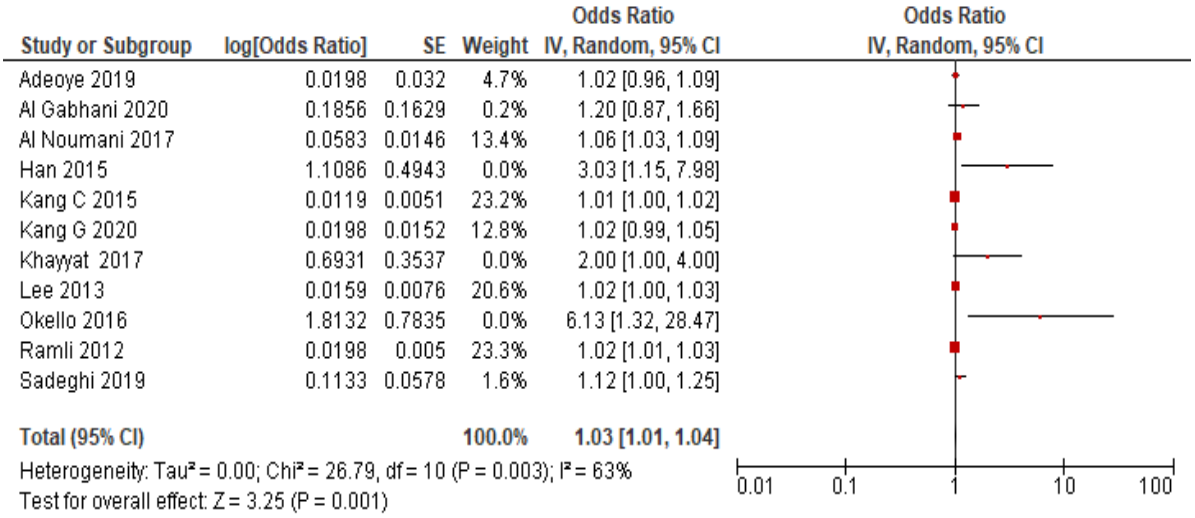

Fig. 1. Forest plot research study of the relationship between age and medication adherence in patients with hypertension

The results of the data analysis of this study indicate that there is a relationship between age and adherence to treatment in patients with hypertension. The overall effect test p value evidence this is less than 0.05, which is $p = 0.001$. The pooled odds ratio value is 1.03 with a 95% confidence interval of 1.00 – 1.04, so it can be concluded that people with hypertension with age (older) tend to be 1.03 times more obedient to treatment. The result of combining these 11 articles is that there is a relationship between age and adherence to hypertension treatment, this can be caused by the number of percentages between articles whose results are related (72.7%) and those that are not related about 27.3%, accompanied by a sufficient number of samples much difference, namely 5324 related samples and 1909 are not related.

B. Meta-analysis of the Relationship between Gender and Medication Adherence of Hypertensive Patients

The heterogeneity test results in 10 articles of this study with a sample of 5440 related to gender variables found that there was heterogeneity because the *p*-value was 0.007 and the I2 value = 63%, so using the random-effects model. The heterogeneity obtained in this study was quite high; this could be due to differences in the population of the research subjects. The largest number of samples is in the [18], as many as 1208, and the smallest number of samples as many as 117.

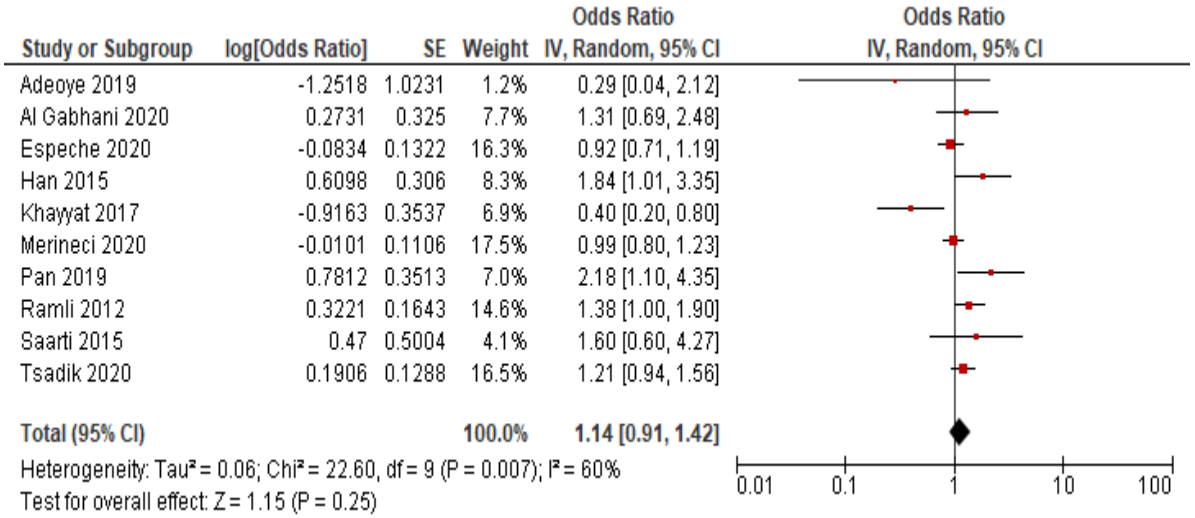

Fig. 2. Forest plot research study of the relationship between gender and adherence to treatment of patients with hypertension

The results of data analysis from this study showed that there was no relationship between gender and adherence to medication for hypertension patients. This is evidenced by the overall effect p test value of more than 0.05, namely $p = 0.25$. The pooled odds ratio value is 1.14 with a 95% confidence interval of 0.91 – 1.4. The assumption of most research studies that there is no relationship between gender and adherence to treatment for hypertension patients suggests that women and men have equal opportunities to adhere to hypertension treatment [18]). There is no difference between the level of compliance of women and men, especially by adjusting the level of education. In addition, adherence is very dependent on each patient, attitude, and behavior.

C. *Meta-analysis of the Relationship between Education Level and Medication Adherence of Hypertensive Patients*

The heterogeneity test results in 10 articles of this study with a sample of 8523 related to the education level variable, it was found that there was heterogeneity because the p-value of $Chi^2 < 0.00001$ and the value of I2 = 87%, so using the random-effects model. The heterogeneity test results have different variations and characteristics showing high heterogeneity (I2 = 87%) so that the random-effects model is used. The largest number of samples is found in [17], as many as 2445, and the smallest number of samples is 174 in [9].

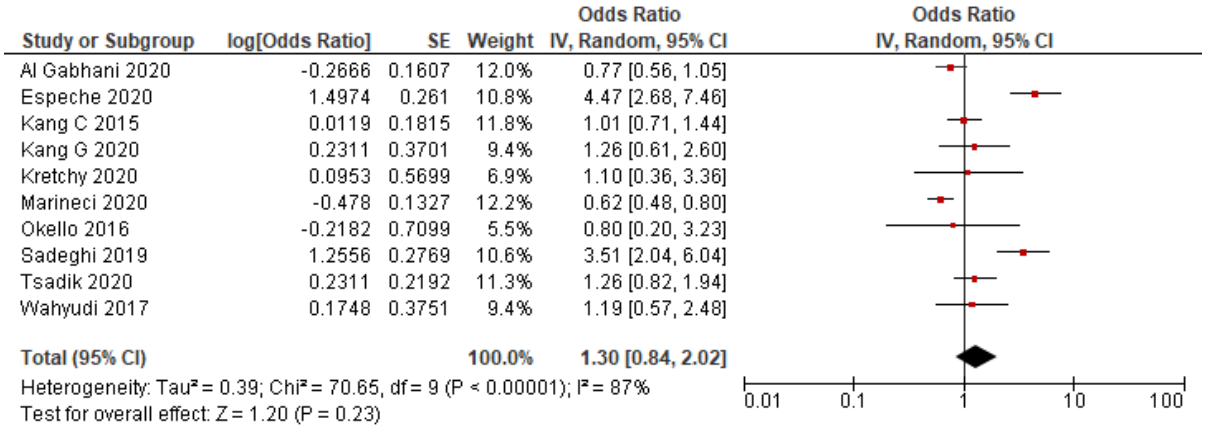

Fig. 3. Forest plot research study of the relationship between education level and medication adherence of hypertension sufferers

The results of data analysis from the entire study showed no relationship between the level of education with Medications adherence of hypertension patients. This is evidenced by the overall effect test with p-value > 0.05, namely $p = 0.23$. The pooled odds ratio value is 1.30 with a 95% confidence interval of 0.84 – 2.02. The assumption of most research studies that there is no relationship between education level and medication adherence of hypertension patients suggests that both higher education and low education have equal opportunities for medication adherence levels.

IV. CONCLUSION & IMPLICATIONS

The results of meta-analysis and data synthesis from previous research articles according to the inclusion criteria, it can be concluded that there is a relationship between age and medication adherence and hypertension patients who are 1.82 times older are more obedient to hypertension treatment, there is no relationship between gender (female) and level of education with medication adherence of patients with hypertension. Recommendations based on the results of this study are related to policies related to adequate resource support for the operational activities of the Elderly Posyandu and PTM Posbindu, as well as support from policymakers for the implementation of basic health services for people with hypertension according to standards, which is also one of the performance indicators in the program indicators in the District or city Minimum Service Standards (SPM) in the health sector with an achievement target of 100%. support the achievement of SPM.

REFERENCES

[1] E. R. Rusida, R. Adhani, and R. Panghiyangani, "The influence of knowledge level, motivation and drug factors on compliance with taking medicines for hypertension patients at the Banjarbaru City Health Center in 2017," *Jurnal Pharmascience*, vol. 4, no. 2, pp. 130–141, 2017.

[2] F. M. Algabbani and A. M. Algabbani, "Treatment adherence among patients with hypertension: Findings from a cross-sectional study," *Clinical*

Hypertension, vol. 26, no. 1, pp. 1–9, 2020. doi: https://doi.org/10.1186/s40885-020-00151-1

[3] T. Roka and M. Ghimire, "Medication adherence among hypertensive patients attending a tertiary care hospital in Nepal," *Journal of Nepal Health Research Council*, vol. 17, no. 4, pp. 521–527, 2019. doi: https://doi.org/10.33314/jnhrc.v17i4.2337

[4] N. Nuratiqa, R. Risnah, M. A. Hafid, A. Paharani, and M. Irwan, "Factors associated with compliance with taking anti-hypertensive medications," *BIMIKI (Berkala Ilmiah Mahasiswa Ilmu Keperawatan Indonesia)*, vol. 8, no. 1, pp. 16–24, 2020.

[5] Y. Rikmasari, A. Rendowati, and A. Putri, "Factors influencing adherence to antihypertensive drugs: Cross sectional study at palembang social health center," *Journal of Science Research*, vol. 22, no. 2, pp. 87–94, 2020. doi: https://doi.org/10.31850/makes.v2i2.146

[6] A. S. Pujasari, H. S. Susanto, and A. Udiyono, "Factors–internal factors of non-adherence to hypertension treatment at the Kedungmundu Public Health Center, Semarang City," *Jurnal of Public Health (Undip)*, vol. 3, no. 3, pp. 99–108, 2017.

[7] S. Hanum, N. R. Puetri, M. Marlinda, and Y. Yasir, "Relationship between knowledge, motivation, and family support with adherence to medication in patients with hypertension at Peukan Bada Public Health Center, Aceh Besar Regency," *Integrated Health Journal*, vol. 10, no. 1, pp. 30–35, 2019. doi: https://doi.org/10.32695/jkt.v10i1.28

[8] S. Arifin, D. Mutiasari, and Ravenalla., *Public Health Science Theory Map*. Jakarta, Indonesia: Mitra Wacana Media, 2020.

[9] C. T. Wahyudi, D. Ratnawati, and S. A. Made, "The influence of demographic, psychosocial, and long suffering of primary hypertension on compliance with taking antihypertensive drugs," *Jkft Journal*, vol. 2, no. 2, pp. 14–28, 2018.

[10] I. A. Kretchy, V. Boima, K. Agyabeng, A. Koduah, and B. Appiah, "Psycho-behavioural factors associated with medication adherence among male out-patients with hypertension in a Ghanaian hospital," *PloS One*, vol. 15, no. 1, pp. 1–15, 2020. doi: https://doi.org/10.1371/journal.pone.0227874

[11] S. Ihwatun, P. Ginandjar, L. D. Saraswati, and A. Udiyono, "Factors related to treatment compliance in hypertension patients in the work area of Pudakpayung Puskesmas City, Semarang in 2019," *Jurnal Kesehatan Masyarakat (Undip)*, vol. 8, no. 3, pp. 352–359, 2020.

[12] T.-P.-L. Nguyen, C. C. Schuiling-Veninga, T. B. Y. Nguyen, T.-H. Vu, E. P. Wright, and M. J. Postma, "Adherence to hypertension medication: Quantitative and qualitative investigations in a rural Northern Vietnamese community," *PloS one*, vol. 12, no. 2, pp. 1–13, 2017. doi: https://doi.org/10.1371/journal.pone.0171203

[13] S. M. Khayyat, S. M. S. Khayyat, R. S. Hyat Alhazmi, M. M. Mohamed, and M. Abdul Hadi, "Predictors of medication adherence and blood pressure control among Saudi hypertensive patients attending primary care clinics: A cross-sectional study," *PloS One*, vol. 12, no. 1, p. e0171255, 2017. doi: https://doi.org/10.1371/journal.pone.0171255

[14] B. M. Akoko, P. N. Fon, R. C. Ngu, and K. B. Ngu, "Knowledge of hypertension and compliance with therapy among hypertensive patients in the Bamenda Health District of Cameroon: A cross-sectional study," *Cardiology and Therapy*, vol. 6, no. 1, pp. 53–67, 2017. doi: https://doi.org/10.1007/s40119-016-0079-x

[15] A. M. Adeoye, A. O. Adebiyi, O. M. Adebayo, and M. O. Owolabi, "Medication adherence and 24-h blood pressure in apparently uncontrolled hypertensive Nigerian patients," *Nigerian Postgraduate Medical Journal*, vol. 26, no. 1, p. 18, 2019. doi: https://doi.org/10.4103/npmj.npmj_147_18

[16] I. N. Purnawan, "Compliance with medication for hypertension patients in the work area of Payangan Health Center, Gianyar Regency," *Jurnal Kesehatan Terpadu*, vol. 3, no. 1, 2019.

[17] C. D. Kang, P. P. Tsang, W. T. Li, H. H. Wang, K. Q. Liu, S. M. Griffiths, and M. C. Wong, "Determinants of medication adherence and blood pressure control among hypertensive patients in Hong Kong: A cross-sectional study," *International Journal of Cardiology*, vol. 182, pp. 250–257, 2015. doi: https://doi.org/10.1016/j.ijcard.2014.12.064

[18] E. A. Mamaghani, E. Hasanpoor, E. Maghsoodi, and F. Soleimani, "Barriers to medication adherence among hypertensive patients in deprived rural areas," *Ethiopian Journal of Health Sciences*, vol. 30, no. 1, pp. 85–94, 2020. doi: https://doi.org/10.4314/ejhs.v30i1.11