ANALYSIS OF CONDOM USE BEHAVIOR, NUMBER OF PARTNERS, AND INJECTING DRUGS WITH THE INCIDENCE OF HIV/AIDS IN INDONESIA: *A SYSTEMATIC REVIEW AND META ANALYSIS*

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ABSTRACT

Background: *HIV/AIDS is a global health problem. HIV epidemic is a major problem and challenge for public health in the world, including Indonesia. HIV transmission can occur through the exchange of various body fluids from an infected person. The incidence of HIV/AIDS is also influenced by various risk factors.*

Methods: *Systematic review and meta-analysis were carried out and were based on the PubMed, Sciencedirect, and Google Scholar databases with search ranges from 2012 to 2022. The articles analyzed were case-control study design articles and were prepared according to PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analyses).*

Results: *Behavioral variables of using condoms in sexual intercourse, having more than one partner, and injecting drug use are at risk for the incidence of HIV/AIDS in Indonesia, which are indicated by a significance p-value less than 0.05.*

Conclusion: *Variables that have a risk for HIV incidence in Indonesia are the behavior of using condoms, the number of partners, and injecting drug use. These three variables are evidenced by significant p-values.*

Keywords: *HIV/AIDS, behavior, Indonesia, meta-analysis*

INTRODUCTION

Human Immunodeficiency Virus (HIV) is a type of virus that infects white blood cells that causes a decrease in human immunity. AIDS (*Acquired Immune Deficiency Syndrome*) is a set of symptoms that arise due to decreased immunity caused by HIV infection.[1]

HIV cases are one of the global health problems. The World Health Organization (WHO) noted that there were about 38.4 million people living with HIV worldwide in 2021. Of that number, the majority came from the African region of 25.6 million cases. Southeast Asia and the United States are next with 3.8 million HIV cases. Based on gender, in 2021 the most HIV cases were women that reached 19.7 million people compared to men, which was 16.9 million people. While based on age groups, global HIV cases in the age group of >15 years as many as 36.7 million cases and in the age group of

children under 15 years there are 1.7 million cases.[2]

The HIV epidemic is a major problem and challenge for public health in the world, including Indonesia. In the executive report on the development of HIV AIDS in Indonesia in the first quarter of 2022, the number of districts/cities that have reported HIV AIDS cases until March 2022 is 502 from 514 regencies/cities in Indonesia. The cumulative number of PLWH found (HIV cases) reported until March 2022 was 329,581 people, while the cumulative number of AIDS cases reported until March 2022 A total of 137,397.[3]

In the January-March 2022 period based on risk factors, homosexuals 30.2%, heterosexuals 12.8%, and sharing needle 0.7%. PLWH presentations were found to be reported in the population group sex worker women 2.9%, MSM 28.8%, shemale 1.3%, constituents 0.7%, penitentiary residents 0.9%, pregnant women 16.7%, TB patients 11.7%, and STI patients 0.8%.[3] Risk factors for transmission through sex are highest risk in homosexuals (30.2%), heterosexuals (12.8%) and sharing needle (0.7%).

HIV transmission can occur through the exchange of various body fluids from an infected person, such as blood, breast milk, semen and vaginal fluids. HIV can also be passed from a mother to her child during pregnancy and childbirth. People cannot become infected through everyday contact such as kissing, hugging, shaking hands, or sharing personal objects, food, or water. (WHO, 2019)[1] According to Ansyori (2016), the spread of HIV / AIDS is not only limited to health problems, but has an impact on the political, economic, social, ethnic, religious, and legal fields, it even has real implications so that sooner or later it can touch all aspects of human life.[4]

METHOD

This study used *systematic review* and *meta-analysis* methods. The study aims to determine the risk factors for HIV/AIDS transmission in Indonesia from 2012 to 2022. The inclusion criteria used are that the selected articles are *free full text / open access* publications, in English and Indonesian, in the period 2012-2022, using a *case-control* study design, The study was conducted in Indonesia, and all selected studies used case samples of HIV/AIDS infected people and control samples of people non infected with HIV/AIDS. Exclusion criteria are articles that are *reviews* such as *literature* review, *systematic review*, not *full text*, and others. Article searches using Google Scholar, PubMed and ScienceDirect databases use the keywords "behavioral risk factors and HIV/AIDS AND Indonesia". Study selection flow chart created using PRISMA (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*) in Review Manager 5.4.1 *software* using *flowchart*. The method of searching for

articles carried out is by searching for studies with set keywords. Then the articles obtained are filtered using inclusion criteria and then recorded by presentation in the form of systematic review tables. Articles that are considered worthy of further analysis. The process of searching and selecting data is attached in Figure 1. Article selection flowchart.

Of the 14 studies that have been selected through inclusion criteria, only 11 studies can be included in the metaanalysis because they have the same study design criteria, namely *case control* and has a p-value and/or OR value. A total of 3 studies were not included because they did not use *a case control* design and were not located in Indonesia. Then, the researchers chose 3 variables in the study article to be studied, namely, sexual behavior number of partners >1, behavior not using condoms, and behavior using injecting drugs. Statistical analysis using Review Manager (Revman 5.4.1) performed by partners in *forest plots*. To see if there is a publication bias, an analysis is carried out using *a funnel plot*.

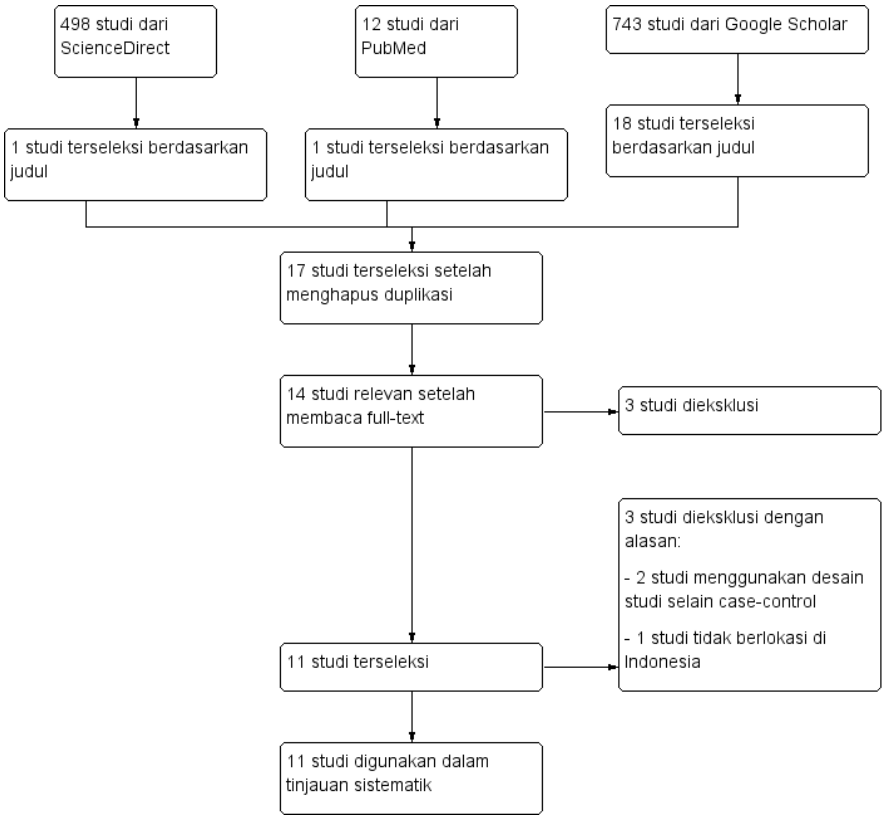

Figure 1. Study selection *flowchart* diagram

RESULT

Table 1. Systematic Study

No	Heading	Study Design	Name, Year	Province, Population	Variable	Result
1.	Factors Influencing the Incidence of HIV Infection in Productive Age at HKBP Balige AIDS Committee[5]	Case-Control	Rina Marlina Manalu, et al., 2019	North Sumatra, All productive age affected by HIV infection in the HKBP Balige AIDS Committee	1. Age 2. Gender 3. Education 4. Work 5. Marital status 6. Risky sex behavior 7. Drug use behavior	The results of statistical tests obtained p value = 0.586 meaning that there is no influence of age with the incidence of HIV infection. The results of statistical tests obtained a value of p = 0.000 means that there is an influence of sex with the incidence of HIV infection.
2.	Risk Factors for HIV/AIDS Transmission in Housewives of Migrant Couples in Kuningan Regency in 2017 [6]	Case-Control	Cecep Heriana, et al., 2017	Kab. Kuningan, West Java, HIV-positive and HIV-negative housewives in Kuningan Regency.	1. Education 2. Economics 3. Knowledge 4. Condom use	Results of educational factors (p = 0. 252, OR=1. 941), economy (p=0. 592, OR=1. 333), knowledge I (0. 789, OR=1. 6), knowledge II (p=0. 558, OR=1. 5) not related to the incidence of HIV/AIDS in migrant mothers. The factor of condom use is related to the incidence of HIV / AIDS in migrant group housewives (p = 0. 000, OR=0. 087).
3.	Risk Factors for HIV Transmission in Serodiscordant Couples at the Makassar Peer Support Group Support Foundation [7]	Case-Control	Mia Riani, et al., 2021	Makassar, South Sulawesi, Serodiscordant couple and HIV couple, who joined Yayasan Peduli Sepeer Support Group Makassar City	Condom use	Based on the results of the statistical continuity correction test, a value of p = 0 was obtained. 043 < 0. 05 then Ha was accepted and Ho was rejected, meaning that not using condoms is a risk factor for HIV transmission in Serodiscordant couples at Yayasan Peduli Peer Support Group in Makassar City.
4.	Risk Factors for HIV/AIDS Infection at RSU Anutapura Palu [8]	Case-Control	Nurhayati, et al., 2018	Palu, Central Sulawesi, All HIV/AIDS patients treated at RSU Anutapura Palu in 2017	1. Heterosexual relationships 2. Men sex men (MSM) relationships 3. Association injecting drug use (constituent)	Heterosexuality is a risk factor for HIV/AIDS incidence at RSU Anutapura Palu with Odds Ratio (OR) = 2. 236 (CI 95% 0.910-5.493), meaning that having heterosexual sexual intercourse has a 2 times greater chance of suffering from HIV/AIDS than respondents who do not have sexual intercourse Heterosexual does not risky. Male Sex Men (MSM) is a factor inthe incidence of HIV/AIDS at RSU Anutapura Palu with Odds

						Ratio (OR) = 1. 971 (CI 95% 0. 871- 4461), meaning that sexual intercourse Men (MSM) have a 2 times greater risk of suffering from HIV / AIDS than respondents who have sexual intercourse Male Sex Men (MSM) are not at risk. The results of statistical tests show that injecting drug users are risk factors for HIV/AIDS events at RSU Anutapura Palu. The results of the analysis also obtained a high Odds Ratio (OR) which is = 9. 302 (CI 95% 1. 118-77. 378), meaning that injecting drug users have a 9 times greater risk of suffering from HIV / AIDS than respondents not at risk of using injecting drugs.
5.	*Risk Factors Affecting the Incidence of HIV/AIDS in Injecting Drug Users (Epidemiological Study in Pontianak City)[9]*	*Case-Control*	*Sumini, et al. 2017*	*Pontianak City, West Kalimantan. The case and control population are injection drug users.*	*1. IDU married status* *2. Behave having a partner is more than equal to two* *3. Injecting drugs, non-working status* *4. Status of use of injecting drug types heroin*	*Factor risk that Influential towards event HIV/AIDS in user Drugs injection that is status IDU marry, Behave have sum spouse ≥ 2 people, inoculate Drugs > 6 times, status do not work IDU yang marry inclined sharing needle and already use Drugs > 5 year and do not use condom moment Related six with spouse other that get Done 2-3 times deep Month because Influenced Use Drugs of outside house (of spots).*
6.	*Risk Factor Analysis of HIV/AIDS Incidence Based on Human Behavior in Madiun Regency in 2018 [10]*	*Case-Control*	*Puri Ratna Kartini, 2021*	*Madiun, East Java. The case group is HIV/AIDS sufferers and the control group is the family/neighbors of HIV/AIDS sufferers*	*1. Practice casual sex* *2. The practice of consuming liquor* *3. Drug use practices* *4. Weak attitudes and practices of religious teachings*	*The results showed that the practice of risky sex (significance value 0. 017 or P<0. 05) and weak practice of religious teachings (significance p value i.e. 0. 021 or P<0. 05) is a risk factor for HIV/AIDS in Madiun Regency in 2018. Meanwhile the practice of injecting drug use (p value is not significance 1. 000 or P>0.05) and the practice of alcohol consumption (value of no significance 0. 355 or p>0. 05) is not a risk factor for HIV/AIDS in Madiun Regency in 2018.*
7.	*Risk Factor of HIV in MSM (Men Sex with Men) Community Partners of Lantera Minangkabau*	*Case-Control*	*Said Firdaus, et al. 2013*	*West Sumatra. The population comes from MSM which is a partner of the Lantera Minangkabau Foundation. The case*	*1. Risky Sexual Behavior* *2. Injecting Drug Use*	*There was a significant association between sexual behavior and HIV incidence (p = 0. 009 and OR = 5.898) while between injecting drug use*

	Foundation West Sumatra[11]			group was infected MSM and the control group was HIV-uninfected MSM		and HIV incidence there was no significant relationship (p = 1. 000 and OR=1. 571). Half of respondents (50%) engaged in sexual harassment at risk of HIV incidence and a small percentage (10.4%) Respondents used injecting drugs.
8.	Analysis of factors associated with the incidence of HIV/AIDS in women[12]	Advanced research using in-depth questions	Pira Prahmawati, 2022	Kab. Pringsewu, Lampung. All women with HIV/AIDS aged 15 years and over who visit/seek treatment at Pringsewu Hospital.	1. Knowledge 2. History of STI disease 3. Condom use status 4. History of HIV/AIDS	Most respondents know about HIV AIDS is good (83.0%). Most respondents had no history of STIs (89. 0%). Most respondents did not use condoms (74.0%). Most respondents did not have husbands with a history of HIV/AID (71.0%). There is a relationship between knowledge (p = 0. 008), STI history (p = 0. 011), condom use (p=0. 000) (p<0.05) with the incidence of HIV/AIDS in women at Pringsewu District Hospital. There was no association between the husband's history of HIV/AIDS (p = 0. 186) (p>0. 05) with HIV/AIDS events in women at Pringsewu District Hospital. Condom use is the most dominant factor in the incidence of HIV AIDS in women at Pringsewu District Hospital
9.	Sexual Behavior, Drug Consumption and The Use of Tattoos with the Incidence of HIV/AIDS in Minang Realm Year 2018[13]	Case-Control	Sri Handayani, 2019	West Sumatra	1. Sexual behavior 2. Drug 3. This	There is a significant relationship between sexual behavior and the incidence of HIV/ AIDS, proven by the value P = 0. 014 (P< 0. 05). OR= 4 and CI: 1. 284 – 12. 468 There was no significant relationship between drug consumption and the incidence of HIV / AIDS, including a P value of 0. 611 (P> 0. 05). There was no significant relationship between tattoo use and the incidence of HIV/AIDS, as evidenced by a P value of 0. 352 (P> 0.05).
10.	Risk Factors for HIV and AIDS Incidence in Adolescents 14-24 Years (Study in Pontianak City) [14]	Case-Control	Iskandar Arfan, 2015	West Kalimantan, adolescents aged 14-24 years infected with HIV and AIDS registered with the AIDS mitigation commission in Pontianak City.	1. Risky behavior (unsafe sex) 2. Poor parental communication 3. Education, status of residence,	Factors that have been shown to influence the incidence of HIV infection and AIDS in adolescents are risky behaviors (unsafe sex) (OR = 12.41 and 95% CI = 3.37-45.71), parental communication (OR = 11. 66 and 95% CI = 4.24-

					risky behavior (injecting drugs), use of TV/cellphone media (viewing pornographic images/videos), use of internet media (viewing pornographic images/videos), parental condition (intact state adolescent parents in the context of whether the adolescent parent is complete and not divorced or died), parental supervision, relationship with parents, peer pressure (sex) as well as peer pressure (injecting drugs).	32.07). The results of the analysis also show that if adolescents experience both of the above, then the chance of being infected with HIV and AIDS is as high as (86%). Factors that were not shown to have an effect were education, status of residence, risky behavior (injecting drugs), use of TV/cellphone media (viewing pornographic images/videos), internet media use (viewing pictures /pornographic video), parental condition .
11.	Men Sex Men, HIV/AIDS and Their Sexual Behavior in Semarang[15]	Case-Control	Forman Novrindo Sidjabat, dkk., 2017	Central Java, men who have sex with other men (including shemale) at least once and live in Semarang City.	1. Age first Related sexual that Divided become two category where age ≤16 year have risk Infected HIV/AIDS; 2. High-risk sexual behavior seen from the number of partners, sexual techniques and activities performed, the use of condoms and lubricants during sexual intercourse; 3. Inconsistent use of condoms; 4. The number of sexual partners is divided into two categories, namely having	The risk factor associated with the incidence of HIV/AIDS in the MSM group was the first age (p = 0. 001; OR= 8. 5 and CI= 2. 32-31. 02), Risky sexual behavior (p = <0. 001; OR= 4. 85; CI= 2. 13-11. 04), Inconsistent use of condoms (p = 0. 004, OR= 3. 4 and CI= 1. 54-7. 49), Number of sexual partners > 1 person (p: 0. 02; OR= 2. 6; CI= 1. 22-5. 81) while gender roles during sexual intercourse for the first time MSM in sexual intercourse are not related to the incidence of HIV infection

					more than one sexual partner and only having one sexual partner 5. *Gender roles during sexual intercourse the first time MSM in sexual intercourse*	

Statistical Analysis

Relationship of Sexual Behavior Number of Partners >1 with the Incidence of HIV/AIDS

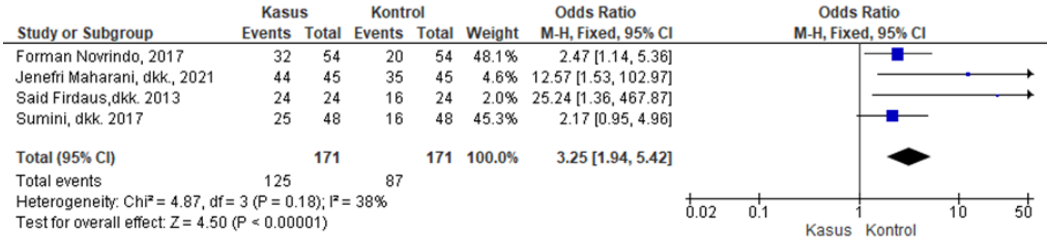

Figure 2. *Forest Plot* of Sexual Behavior Relationship Number of >1 Partners with the Incidence of HIV/AIDS

Relationship of Unprotected Behavior with HIV/AIDS Incidence

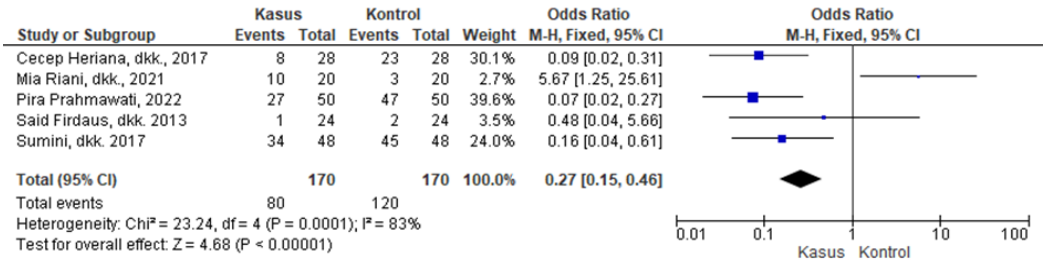

Figure 3. *Forest Plot of Relationship* of Unprotected Behavior with HIV/AIDS Incidence

The Relationship of Injecting Drug Use Behavior with the Incidence of HIV / AIDS

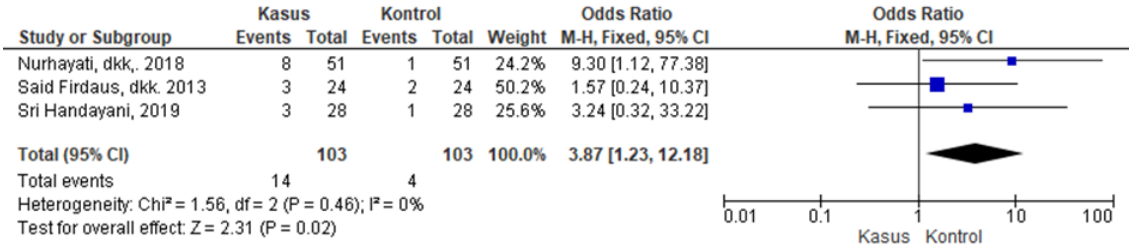

Figure 4. *Forest Plots the* Relationship between Drug Use and Injection with HIV/AIDS Incidence

Publication Bias Analysis

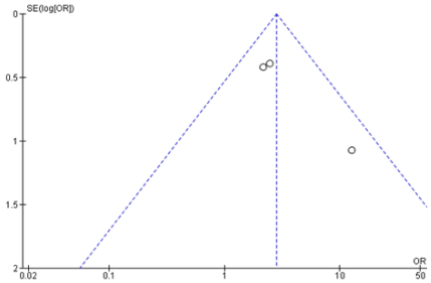

Figure 5. *Funnel Plot* of Sexual Behavior Relationship Number of Partners >1 with HIV/AIDS Incidence

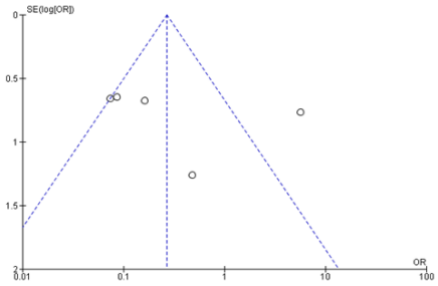

Figure 6. *Funnel Plot* of Relationship of Unprotected Behavior with HIV/AIDS Incidence

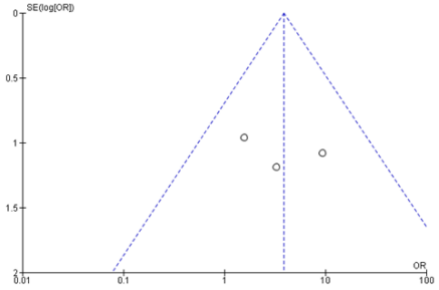

Figure 7. *Funnel Plot* of the Relationship of Injecting Drug Use Behavior with the Incidence of HIV/AIDS

Based on Figure 5, Figure 6, and Figure 7, it is known that the results of the studies obtained are not distributed symmetrically, indicating publication bias.

DISCUSSION

Based on the 11 articles contained in table 1. Systematic Review is known to have 21 independent variables that are variables in the incidence of HIV / AIDS. These variables include some that are behavioral factors and some are outside

the behavioral factors. beyond behavioral factors such as age, gender, education, knowledge, marital status, occupation, and economy. Behavioral factors include alcohol consumption, injecting drug use, risky sexual behavior, sex with more than a partner, promiscuous sex practices, history STI disease, history of HIV/AIDS, heterosexual relationships, weak religious attitudes and practices, condom use in sexual intercourse and so on. In this article, independent variables are analyzed in the form of behavioral risk factors of HIV / / AIDS events, namely condom use, the number of partners in sexual intercourse more of one, and injecting drug use.

In the results of statistical analysis of 11 articles continued in the meta-analysis, three variables were found that were most discussed and studied in relation to the incidence of HIV / AIDS. Based on the results of the analysis in figure 2. forest plot, the combined OR value was 3.25 (CI 95 %:1.94 - 5.42) or people with sexual behavior had more than one partner 3.25 times more at risk of getting HIV/AIDS than people who have a number of sexual partners of one person. In the combined effect estimation section, p value of less than 0.05 can be said to have sex with a partner of more than one person has a significant relationship with the incidence of HIV/AIDS. In the *heterogeneity test* results section, p value of 0.18 was obtained which means that the population in the study was homogeneous.

Risk factors in the form of behavior not using condoms during sexual intercourse significantly affect the incidence of HIV / AIDS. This is shown in figure 3. forest plot where a combined OR value of 0.27 (CI 95%: 0.15 - 0.46) or sexual intercourse without using condoms is 0.27 times more the risk of HIV / AIDS transmission compared to sexual behavior using condoms. In the estimation of the effect, p value of less than 0.05 can be said to be related to sexual without using a condom has a significant relationship with the incidence of HIV / AIDS. The results of the analysis on the heterogeneity test showed p value of 0.0001 which means the population in the study is heterogeneous.

In figure 4. forest plot, the combined OR value of risk factors in the form of injecting drug behavior was 3.87 (CI 95%: 1.23 - 12.18) or it can be said that the behavior of using injecting drugs was 3.87 times more risk of getting HIV / AIDS compared to behavior not using injecting drugs. In the estimation of the effect, p value of less than 0.05 can be said that injecting drug use has a significant relationship with the incidence of HIV / AIDS. The results of the analysis on the heterogeneity test showed p value of 0.46 which means the population in the study was homogeneous.

CONCLUSION

The meta-analysis conducted found that all three variables positively influenced the incidence of HIV infection in Indonesia, namely the variables of condom use, the number of seizures, and injecting drug use.

Based on the analysis conducted on the three variables showed a significance value of $p < 0.05$ with details on the variables of the number of partners, condom use behavior, and drug use The injections are $P<0.00001$, $P<0.00001$, and $P=0.02$, respectively.

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