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DIFFERENCES IN ANTI-CCP EXAMINATION RESULTS IN MOTORBIKE TAXI DRIVERS WITH 1-3 YEARS OF WORK AND MORE THAN 3 YEARS USING THE ELISA METHOD

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ABSTRACT

Rheumatoid arthritis (RA) is a chronic autoimmune disease that generally causes inflammation of the joints. Most RA patients have not shown typical clinical symptoms at the beginning of the disease, so it is necessary to carry out laboratory tests such as anti-CCP. Anti-CCP is synthesized as a result of an immune response against joint proteins which are citrulinated in the post-translation. The cause of the autoantigen process is not known for certain, it is strongly suspected due to foreign agents such as viruses and bacteria. This condition is very vulnerable for motorcycle taxi drivers who can spend 8-12 hours on the road. Motorcycle taxi drivers are very at risk of being exposed to various pollutant materials such as dust, gas, and microorganisms, either bacteria or viruses. Motorcycle taxi drivers with longer working periods, will increase anti-CCP levels, due to amount of concentration and length of time exposed by pollutant materials is higher. The working period is divided into 2 categories, namely new workers with 3 years of service and old workers with > 3 years of service. The purpose of this study is to determine the differences of anti-CCP test results in motorcycle taxi driver with 1-3 years service and more than 3 years service using ELISA method. The number of samples is 20 people who are motorcycle taxi drivers in Kedungmundu District taken using a consecutive sampling technique. The results shown that the average anti-CCP value for motorcycle taxi drivers with 1-3 years of service was 2,409 ng/ml, while > 3 years of service was 4,994 ng/ml. Independent t-test shown a significance value of 0.000 (P<0.05), which means there is a significant difference between the results of anti-CCP examinations for motorcycle taxi drivers with 1-3 years of service and more than 3 years.

INTRODUCTION

RA (rheumatoid arthritis) is a chronic autoimmune disease that generally causes inflammation of the joints. RA sufferers will experience symptoms in the form of pain in the synovial part of the joints and tendon sheaths, as well as thickening due to inflammation followed by erosion and destruction of the bones around the joints (Singh et al., 2016). The impact of this condition can disturb the comfort and limit the sufferer's mobility. In conditions of uncontrolled RA, progressive joint damage occurs, so that sufferers can experience disability and even premature death (6).

In 2016, RA sufferers reached 335 million people worldwide and it is estimated that this will increase every year (10). The prevalence and incidence of this disease varies from one population to another, in the United States and several areas in Europe the prevalence of RA is around 1% in

adult Caucasians, France is around 0.3%, England and Finland is around 0.8% and the United States is 1.1 % while in China it is around 0.28%. Japan around 1.7% and India 0.75%.

The results of Basic Health Research in 2018 showed that the prevalence of joint disease based on doctor's diagnosis in the population aged ≥15 years in Indonesia reached 7.30% with the highest prevalence in Aceh, namely 13.3%, while Central Java was 6.78. Based on the grouping of gender characteristics, it is known that the prevalence of joint disease is more common in women (8.46%) than men (6.13%). Data from the Indonesian Ministry of Health in 2016 shows that the number of people with rheumatoid arthritis in community health centers in Indonesia is mostly in the productive and pre-elderly age group, namely 35-59 years, amounting to 930 people.

The cause of RA is not yet known with certainty. It is suspected that there are two factors that can trigger RA, namely endogenous and exogenous factors. Endogenous factors are genetics, gender, history of atrophy, especially due to age. Exogenous factors include agent characteristics, lifestyle, exposure to foreign compounds due to microorganisms or free radicals, and work (Joo et al., 2019).

RA patients generally do not show typical clinical symptoms in the early stages of the disease, so to determine the diagnosis it is necessary to carry out laboratory tests, one of which is anti-cyclic citrullinated peptide (anti-CCP) examination. Anti-CCP examination can be used for early diagnosis of RA, because anti-CCP in the blood can be seen at an early stage of the disease. The anti-CCP examination has high sensitivity and specificity compared to similar examinations such as RF. The sensitivity of anti-CCP is known to reach 94% with a specificity of 81-100%, so it can differentiate RA from other autoimmune diseases such as systemic lupus erythematosus(SLE), Sjogren's syndrome, or polymyositis/dermatomyositis. anti-CCP is a strong predictor of the development of erosive disease (1).

Anti-CCP is an antibody synthesized by the immune system in response to the presence of citrullinated peptide antigens. Citrulline is not encoded directly by DNA, but several proteins are known to contain citrulline, such as proteins found in joints (3). Citrulline can change protein structure, thereby triggering an immune response and producing autoantibodies against joint proteins. The cause of this autoimmune process is not yet known with certainty, it is strongly suspected that foreign agents such as viruses and bacteria trigger the infection (1).

Motorbike taxi driving is a job that is very susceptible to exposure to various pollutants such as dust, gas and microorganisms, both bacteria and viruses. These pollutant materials generally have poisonous or toxic properties which are dangerous for living organisms because they can cause various health problems, especially to the physiological functions of body organs. Serious clinical manifestations due to frequent and long exposure to pollutant materials are generally newwill be felt in the long term (5).

One of the diseases that often occurs in motorcycle taxi drivers is RA. While working, motorcycle taxi drivers can spend 8-12 hours on the road or even more depending on how many passengers they get. The longer the time and period of work of a motorbike taxi driver, the greater the amount of exposure that accumulates in the body. This condition can result in increased anti-CCP levels so that the risk of developing RA is greater (2).

Work period is the period of time or length of time a person does work in a certain field starting from the first day he starts working until a certain time limit. Working period is the accumulation of a person's work activities carried out over a long period of time. Working period is divided into 2 categories, namely new category working period ≤ 3 years and old category working period ≥ 3 years (Handoko, 2007).

Research regarding differences in anti-CCP examination results in motorcycle taxi drivers with 1-3 years of service and more than 3 years has never been studied, so this research needs to be carried

out to find out whether there are differences in anti-CCP levels in motorcycle taxi drivers based on length of service.

METHODOLOGY

The type of research is analytical observational with a cross-sectional approach, where data collection for each variable is carried out at the same time at one time, to determine differences in anti-CCP levels in motorcycle taxi drivers based on length of service.

The research population was motorbike taxi drivers, both online motorbike taxis and conventional/based motorbike taxis in Kedungmundu District, Semarang City. Sampling used a consecutive sampling technique, that is, every research subject who met the inclusion and exclusion criteria was included in the research sample until the number was met.

Research sampling was carried out by conducting a questionnaire survey of online and conventional motorcycle taxi drivers at several motorcycle taxi base points. Based on the survey results, the number of motorcycle taxi drivers who were willing to be respondents and met the research criteria was 20 people. This number is still below the minimum research sample size of 38 respondents. However, due to the large number of motorcycle taxi drivers who did not meet the criteria and limited research time, the minimum sample size in this study was determined to be 20 respondents consisting of 10 motorcycle taxi drivers with a working period of 1 - 3 years and 10 other motorcycle taxi driverswith a working period of more than 3 years.

The data from the examination results were tested for normality using Shapiro-Wilk and continued with hypothesis testing with an independent t-test.

RESULTS AND DISCUSSION

Descriptive Data analysis

Results of anti-CCP examination of motorcycle taxi drivers with a service period of 1-3 years and more than 3 years as in table 4.

Table 1. Anti-CCP inspection results for motorcycle taxi drivers

	Σ Sample	**Maximum Level (ng/ml)**	**Minimum Level (ng/ml)**	**Average (ng/ml)**
Working Period < 3 years	10	3,422	0,092	2,409
Working Period > 3 years	10	7,301	3,820	4,994

Based on table 1, the results of the anti-CCP examination with the highest levels in motorcycle taxi drivers with 1-3 years of service were 3.422 ng/ml while the lowest was 0.092 ng/ml. In motorcycle taxi drivers with more than 3 years of service, the highest anti-CCP level was found to be 7,301 ng/ml and the lowest was 3,820 ng/ml. The average anti-CCP examination value for motorbike taxi drivers with 1-3 years of service was 2,409 ng/ml, while for motorbike taxi drivers with >3 years of service was 4,994 ng/ml. The difference in mean between these two variables is 2.585 ng/ml. A total of 20 serum samples examined showed higher anti-CCP levels in all samples of motorcycle taxi drivers with more than 3 years of service.

Differential Data analysis

Data from both variables are normally distributed ($p > 0.05$). The anti-CCP level in motorcycle taxi drivers with a service period of 1-3 years has a p-value of 0.073, while the p-value of the anti-

CCP level in motorcycle taxi drivers with a service period of >3 years is 0.102. Hypothesis testing using parametric bivariate analysis with independent t-test.

Hypothesis test results show a significance value of 0.000 ($p<0.05$), then Ha is accepted and H0 is rejected, which means there is a significant difference between the results of anti-CCP examinations for motorcycle taxi drivers with a working period of 1-3 years and more than 3 years using the method ELISA.

Discussion

Based on the t-test, it is known that there are significant differences between the two research variables. The risk of increasing anti-CCP levels will be greater in motorcycle taxi drivers with > 3 years of service. One of the causes of increased anti-CCP levels is due to autoantigens in most joint proteins. The cause of autoantigens is not yet known with certainty, it is strongly suspected that foreign agents such as viruses and bacteria trigger infections.

Based on field studies, it is known that generally motorcycle taxi drivers with a service period of 1-3 years have working hours of around 8-10 hours, while motorcycle taxi drivers with a service period of >3 years can work up to >12 hours a day. The longer the time and period of work of a motorbike taxi driver, the greater the amount of exposure to pollutants and foreign agents that accumulate in the body. These pollutants generally have poisonous or toxic properties that are dangerous for living organisms if exposed continuously and can be one of the causes of increased levels of anti-CCP in the blood (Avouac et al., 2011). High levels of anti-CCP will result in inflammation followed by erosion and destruction of joint tissue. The impact of this condition can cause pain in the joint area and cause swelling due to thickening of the synovial joints and tendon sheaths, which will disturb the comfort and limit the sufferer's mobility (9).

Anti-CCP is an antibody synthesized by the immune system in response to the presence of citrullinated peptide antigens. Citrulline is not encoded by DNA directly, but several proteins are known to contain citrulline as a result of post-translational modification (Favalli et al., 2020). In the inflammatory process, the enzyme peptidylarginine deiminase (PADs) converts arginine into citruline as in the protein vimentin. Vimentin is an intermediate filament protein found in joints, both intracellular and extracellular. Vimentin is the target of various post-translational modifications including citrullination or deiminases. If the shape changes significantly, the protein will be considered an antigen, thereby triggering an immune response and producing autoantibodies against joint proteins. Anti-CCP appears in the early stages of the disease, and if found in high levels in the body it indicates a positive RA result (1).

RA (rheumatoid arthritis) is a chronic autoimmune disease characterized by inflammation of the joints and other body tissues. Based on data on the incidence of RA, it is suspected that there are two factors that can trigger RA, namely endogenous and exogenous factors. Endogenous factors, namely genetics, gender, history of atrophy, especially due to age. Exogenous factors include agent characteristics, lifestyle, work, exposure to pollutants and foreign compounds due to microorganisms or free radicals. However, viral and bacterial infections are suspected to be the initial triggers for RA (7).

Motorbike taxi drivers have erratic working hours and can spend 8-12 hours on the road or even more depending on how many passengers they get. Many of these motorbike taxi drivers have worked for quite a long time with years of service. Working period is divided into 2 categories, namely new category working period $\leq$ 3 years and old category working period $\geq$ 3 years (4). While on the road, motorcycle taxi drivers are at risk of being exposed to various pollutants. Pollutant materials such as dust, gas and microorganisms, both bacteria and viruses, if exposed for a long period of time, will result in serious clinical manifestations (5).

One of the diseases that often occurs in motorcycle taxi drivers is RA. The longer the time and period of work of a motorbike taxi driver, the greater the amount of exposure that accumulates in

the body. This condition can result in increased anti-CCP levels so that the risk of developing RA is greater (DiBerardinis, 2010). This statement is in line with the results of this study which show that anti-CCP levels are higher in motorcycle taxi drivers with > 3 years of service compared to motorcycle taxi drivers with 1-3 years of service, so the risk of RA in motorcycle taxi drivers with > 3 years of service will be greater.

CONCLUSION

Based on the results of research that has been carried out, it is known that the average value of anti-CCP levels for motorcycle taxi drivers with a service period of 1-3 years is 2,409 ng/ml, while the average value of anti-CCP levels for motorcycle taxi drivers with a service period of more than 3 years amounted to 4.994 ng/ml. There is a significant difference between the differences in anti-CCP examination results for motorcycle taxi drivers with 1-3 years of service and more than 3 years using the ELISA method with a significance value of p = 0.000.

Suggestion

From the results of the research above, researchers convey advice to road users, especially motorcycle taxi drivers, to always pay attention to driving safety by always using a helmet, wearing long closed clothes and jackets, wearing masks, gloves and footwearclosed to reduce the risk of exposure to pollutants. For future researchers, it is necessary to carry out further research regarding differences in anti-CCP levels in motorbike taxi drivers based on length of service by paying attention to confounding variables such as smoking habits. Other research that needs to be studied is regarding the relationship between the level of knowledge and the treatment of RA in motorbike taxi drivers

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