Article

BONE DENSITY OF THE LUMBAR SPINE L1-L4 AND FEMUR NECK ON CHILDBEARING AGE WOMAN WHO ARE IMPLANT AND NON HORMONAL CONTRACEPTIVES ACCEPTORS.

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A B S T R A C T

Implant contraception is one type of contraceptive in the form of an implant made of silastik rubber containing the progestin hormone (levonogestrel) attached to the upper arm. This contraceptives are effective enough to prevent pregnancy in long-term with a lifetime of 3 years for 2 sticks and 1 stick implant. The main principle of levonorgestrel implants was to inhibit the ovulation resulting suppression of estrogen production. Estrogen is one of the important factors in bone remodeling. This becomes our concerns about the effect of implant use on the bone health status of the acceptors. The objective of this study is to determine mean difference of bone mineral density of the Lumbar Spine L1-L4 and Femur Neck on childbearing age woman who are implant acceptors and non hormonal family planning acceptors.

This study was analytic survey with cross sectional design. The population in this study were all childbearing age woman in the work area of South Klaten Public Health Center. The sample were 30 people using purposive sampling. Data analysis was performed using Unpaired T-test with $p \leq 0.05$.

The result of examination on implant acceptor group totaling 15 people shown that the average of T-Score Lumbar Spine L1-L4 bone density was 0,51 and T-score of Femur neck bone was 0,1. While the results of bone density examination in the group of acceptor non hormonal totaling 15 people shown that the average value of T-score Lumbar Spine L1-L4 was 0.72, whereas the mean value of T-score of femur neck bone was 0.06. Unpaired T-Test statistic test for difference of bumble density of Lumbar Spine L1-L4 and Femur Neck between the two groups obtained P value 0.611 and 0.889 (P> 0,05). So there is no statistically significant difference between Lumbar spine L1-L4 and Femur neck bone density on childbearing age woman who are non-hormonal and implant acceptors.

Keyword: Bone density, Lumbar Spine L1-L4, Femur neck, Implant, non hormonal Contraceptive

I. INTRODUCTION

The use of hormonal contraceptives as one of the contraceptive devices increased sharply. According to WHO, today nearly 380 million couples run family planning and 65-75 million of them, especially in developing countries, using oral, injectable, and implanted contraceptives. The number of family planning acceptors using non-hormonal contraception is because non-hormonal contraception is one of the most effective methods of contraception to prevent conception (Baziad, 2002).

Hormonal contraception is a contraceptive containing steroid hormones estrogen and progesterone hormones. Hormones contained in non-hormonal contraception are only progesterone hormones or a combination of estrogen and progesterone. Current hormonal hormonal contraceptives may be pills, syringes or implants. Although effective in preventing pregnancy but can not be denied the emergence of other consequences of the use of contraceptive devices, especially the use of hormonal contraceptive contraception .

One of the effects of hormonal contraceptives, especially those containing only progesterone hormone is to bone health is the increased risk of osteoporosis (bone loss). In 2004 the FDA (*Food And Drug Administration*) announced a warning that the "black box" mark should be added to the *Depot Medroxyprogesterone Acetate* (DMPA) lacquer linked to the long-term effects on bone mineral density. Based on this warning women should use DMPA contraception as a contraceptive for no more than two years if other methods of contraception are inadequate (Kamitz, 2005). DMPA is met o de CICs containing only the hormone progesterone.

Based on the preliminary survey obtained data on the number of family planning participants in South Klaten District in 2016 reached 4231 acceptors. The family planning acceptors consist of 534 (8.36%) of IUD acceptors, MOW 327 (7.72%), MOP 18 (0.04%), condoms 165 (3.89%), implant 342 (8.08%), 2482 injections (58.66%), 363 pills (8.57%). Based on these data, the implant acceptors are pretty much 8.08% of the total number of acceptors in South Klaten subdistrict.

Implant contraception is one type of contraceptive in the form of an implant made of a kind of silastik rubber containing the hormone progestin (levonogestrel) attached to the upper arm. These contraceptives are effective enough to prevent pregnancy and long-term with a lifespan of 3 years for 2 sticks and one stem type (saifudin, 2003)

The main mode of action of levonorgestrel implants with inhibition of ovulation causes estrogen production suppression. Estrogen is one of the important factors in *remodeling* bone. This raises concerns about the effect of implant use on the bone health status of the wearer.

To determine the risk factors for osteoporosis risk of bone fracture in a person is to conduct examination of bone *mineral density* (WHO, 2005). To evaluate the risk of fractures is often done measurement of bone density in the spine (*Lumbar Spine*) and femoral *neck* (*Femoral Neck*).

Research on the effect of implant use on bone density is currently underway, while it is a contraceptive that contains only the progesterone hormone that results in the suppression of estrogen production.

II. METHODS

This study was an analytical survey with cross sectional design to determine the relationship between risk factors with the impact or effect. Risk factors and their effects or effects are observed at the same time (Notoatmodjo, 2005). This study was conducted in the working area of South Klaten Public Health Center Population in this study is Women at childbearing age in work area of South Klaten Health Center. The sample size used in this study were 30 respondents consisting of 15 respondents from implants acceptor group and 15 respondents from non family hormonal acceptor group. Research instrument used in this research there are two kinds of tools Dual Enegy X-Ray Absorptiometry (DEXA) to measure bone mineral density of respondents and questionnaires to collect data characteristic of respondents. Statistical test used is independent test T-Test (parametric test) by using the help of computer program SPSS 16.0 for Windows

III. RESULT

The study was carried out in the Regional Health Center of South Klaten in July to September 2017. The sample size in this study was 30 people consisting of 15 acceptor implants and 15 women of childbearing age who used non-hormonal and non-family planning. The

results of this study will be presented in the distribution of respondent characteristics and statistical analysis results of mineral bone density between implant acceptor and non hormonal contraceptives acceptor.

1. Characteristics of Age-Based Research Respondents

The following table shows the frequency distribution of respondent's research characteristics from the implants acceptor group and the non-hormonal contraceptives acceptor group (IUD and not using contraception).

Table 1 . Frequency Distribution of Age-Based Research Respondents

Age (Year)	Implant Acceptors		non hormonal acceptor		The value of p
	n	%	N	%	
30-40	6	40	8	53.3	0.464
41-50	9	60	7	46.7	
amount	15	100	15	100	

Chi Square Test (X ^{2}): p = 0,464

Based on table 4.1 above from the results of the study of 30 respondents consisting of 15 people group of implant acceptors and 15 non-hormonal acceptor group that is women of childbearing age using non-hormonal acceptors and not using contraception at all. In the implant acceptor group as many as 6 people (40%) aged 30-40 years and as many as 9 people (60%) aged 41-50 years. In the non hormonal acceptor group of 8 people (53.3%) aged 30-40 years and as many as 7 people (46.7%) were 41-50 years old. After statistical test with Chi Square to see the difference of age between group of implant acceptor and hormonal group got result p value = 0,464 (p > 0,05). statistically there was no significant difference of age of respondent between age group of implant acceptor and non hormonal acceptor group.

2. Characteristics of Respondents Research by Activity

The pattern of respondent's research activity is to exercise ≥ 30 minutes a day from one or more types of gymnastics, aerobic, bicycle, jogging, morning walk, jogging and swimming. In addition to sports activity patterns of respondents are also seen from the activities /

daily activities doing homework, washing, cleaning and working outdoors within ≥ 30 minutes in a day. The following table presents the frequency distribution and statistical test results with chi square based on activity patterns on the implant acceptor group and non-hormonal acceptors.

Table 2 . Frequency Distribution of Respondent Research Based on Activity Pattern

Activity Patterns	Implant Acceptors		KB non hormonal acceptor		The value of p
	N	%	n	%	
Sports					
Yes	14	93.3	5	33.3	0.001
No	1	6.7	10	66.7	
Daily job					
Yes	15	100	15	100	
No	0	0	0	0	

Chi Square Test (X ^{2}): p = 0.001

Based on table 2 can be seen frequency distribution of activity patterns of respondents research consisting of sports and doing daily work ≥ 30 minutes. The frequency distribution of sport activity pattern on the implant acceptor is 14 people (93,3%) while those who do not exercise is 1 person (6,7%). While the pattern of sports activity in non hormonal acceptor group as many as 5 people (33.3%) who do sports while those who do not exercise as much as 10 people (66.7%). After statistical test with Chi square test, p = 0,001 (p <0,005) then statistically there is a significant difference of sports activity pattern between implants acceptor group and non hormonal acceptor group.

Frequency distribution of activity pattern doing daily work based on table 2 found all respondents (100%) both from group of implant acceptor and non hormonal acceptors do daily activities such as housework sweeping, washing, mopping, cooking, others as well as work outdoors.

3. Characteristics of Respondents Based on Habits Research

Habit of study respondents include drinking coffee habit, drinking alcohol and smoking. The following table presents the frequency distribution of respondents based on research habits.

Table 3 . Frequency Distribution Characteristics of Respondents Based on Habitual Penelties

Activity Patterns	Implant Acceptors		KB non hormonal acceptor		The value of p
	n	%	n	%	
Drinking coffee					0.361
Yes	4	26.7	2	13.3	
No	11	73.3	13	86.7	
Drinking Alcohol					
Yes	0	0	0	0	
No	15	100	15	100	
Smoking					
Yes	0	0	0	0	
No	15	100	15	100	

Chi Square Test (X^2): p = 0.361

Based on table 3 . above can be seen frequency distribution of respondent characteristics of research based on coffee drinking habits in group of implant acceptors mostly not drinking coffee that is as much as 11 people (73,3%) and in group of non hormonal acceptors mostly do not have habit of drinking coffee that is 13 people (86.7%). After statistical test with chi square test, p = 0,361 (p > 0,05), statistically there is no difference between coffee consumption habits between implants acceptor group and non hormonal acceptor group .

Characteristics of respondents based on alcohol drinking habits , based on table 3 above can be seen that all respondents (100%) both in groups of acceptors of implants and hormonal groups do not have a habit of drinking alcohol. Based on table 3. it can also be seen that all respondents of the study (100%) both groups of implants acceptor or group of non-hormonal acceptors have no smoking habit.

4. Bone density of the lumbar spine l1-l4 and femur neck On implant and non hormonal contraceptives acceptors.

The following table shows the results of bone density examination of *Lumbar spine* and *Femur Neck* expressed in T-score on Implant and non-hormonal acceptors.

Table 4 . Average BDD (*Bone Mineral Density*), *Lumbar Spine* L1-L4 T-Score and *Femur Neck* On Implant and non-hormonal acceptors.

Variables	Average	
	Group of Implant Acceptors	Non Hormonal Group
BMD *Lumbar Spine* L1-L4	1.1470	1.2045
T-Score *Lumbar Spine* L1-L4	0.51	0.72
BMD *Femur Neck*	0.9197	0.9218
T-Score *Femur Neck*	0.1 0	0.12

Based on table 4. It was found that the average bone mineral density (BMD) of *Lumbar Spine* L1-L4 group of implants acceptor (1,1470 gr / cm^2) was lower compared to non-hormonal acceptor group (1.2045 gr / cm^2). However, the difference of bone mineral density of Lumbar Spine L1-L4 between group of implant acceptors with non hormonal group is not much that is only 0,057. The same is true for the T-Score group of implanted acceptors (0.51) lower than the non-hormonal acceptor group (0.72).

Based on table 4 it is also known that the mean bone mineral density (BMD) of the hip (Femur Neck) group of implants acceptor (0.9197 gr / cm2) is slightly lower compared to the non-hormonal acceptor group (0.9218 gr / cm2). The same is true for the T-Score group of implanted acceptors (0.10) slightly higher than the non-hormonal acceptor group (0.12).

Table 5. Different T-Score Test Result bone density of the lumbar spine l1-l4 and femur neck between groups of Implant Acceptors and Non-Hormonal Acceptors with Unpaired T-Tests (Parametric Statistics)

Variables	95% *Confident Interval*		
	The value of P	Lower	Upper
Lumbar Spine L1-L4	0.611	-0.616	1.029
Femur Neck	0.889	0.624	0.544

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Based on table 5. the results of the analysis with parametric statistics because all data is normally distributed. The statistical test used is an Unaired T-test to determine the average difference of T-score of bone density of Lumbar Spine L1-L4 and Femur Neck between the implant acceptor group and the non-hormonal acceptor group. The result of P value was 0,611

(P> 0,05) on result of difference test of T-score of Lumbar Spine L1-L4 bone density between implant and non hormonal group. Based on table 5. It can also be seen that the unpaired test T-test to test the average difference of T-score bone density Femur Neck obtained value was 0,889. Thus, there was no statistically significant difference between the mean T-score of Lumbar SpineL1-L4 bone density and Femur Neck on non-hormonal acceptor and non-hormonal acceptor.

IV. DISCUSSION

This study was conducted on 30 respondents consisting of 15 implant acceptor and 15 non hormonal acceptors who did not use any contraceptive nor using contraceptive but who did not contain hormonal ie IUD (Intra Uterin Device). In the implant acceptor group selected those who have used the implant at least after 2 years. Researchers determined inclusion criteria for minimum 2 years implant acceptors because they were associated with decreased bone mineral density in hormonal acceptors especially those containing only the progesterone hormone. Implants contain the hormone Levonogestrel which is a derivative of the hormone progesterone. In contraceptives containing only progesterone hormones such as implants, it can suppress estrogen production that can cause osteopenia and increase long-term risk of fracture (Westhoff, 2003). Ovarian estrogen production is also suppressed, long-term use has characteristic levels of plasma estradiol present in or below the current level of the follicular phase. This relative estrogen deficiency is associated with loss of estrogen inhibition effects on bone resorption, which may have adverse effects on bone mineral density. A study conducted by Diza in 2008 on the comparison of bone mineral density in injecting users combined with injectors of long-term medroxyprogesterone acetate in the Mandala Medan clinic, stated that bone mineral density decreased significantly in the DMPA family of users who took more than two years compared to the mixed-use family of contraceptive group. Another study examining the relationship between bone mineral density and progesterone hormone was a study conducted by Son et al in 2004 on the effect of contraceptive injecting depot medroxyprogesterone acetate (DMPA) on bone mineral density in women of reproductive age. The results suggest that the fastest statistically significant difference in bone mineral density of DMPA contraceptive users with other women using contraceptives. Bone mineral density in DMPA syringe acceptors is lower than bone mineral density as there are other contraceptive acceptors.

All respondents checked their bone mineral density (DMT) by using *Dual Enegy X-Ray Absorptiometry* (DEXA). The tool is a "gold standard" for bone mineral density examination. The DMT examination was performed at Orthopedic Hospital Prof.Dr. Soeharso Surakarta. DMT examination with DEXA examined bone mineral density at two sites namely *Lumbar Spine* (LI-L4) and *Left Femur neck* to determine the level of risk of fracture in patients. The results of DMT examination revealed by T-score is the difference between the value / results obtained from the respondents compared with the results in the mean of young adults indicated by the units of the standard intersection of young adult population.

Based on the results of the study of 30 respondents consisting of 15 people group of implant acceptors and 15 non hormonal acceptor group that is women of reproductive age using non hormonal contraception and not using contraception at all. After statistical test with Chi Square to see the difference of age between group of implant acceptor and hormonal group got result p value = 0,464 (p> 0,05). statistically there was no significant difference of age of respondent between age group of implant acceptor and non hormonal acceptor group. Results of research conducted by Rahmawati in 2016 showed a significant negative relationship between age with bone mineral density as indicated by values = 0.002 and r = 0.388. The results are in line with Mulyono's 1999 study that age is negatively correlated with bone mineral density in postmenopausal women in Jakarta. The same results are also described by Unnietal (2010) in women over 40 years in India. Age as one of the factors that negatively correlates with bone mineral density is related to the aging process. Growing age results in less bone formation than resorption. Reduced osteoblast capability of new bone formation can be caused by cellular damage or reduced local growth factors necessary to spur new bone cell growth (Whitney, 2000). The process of resorption exceeds the formation after the age of 30-45 years, this imbalance is due to increased osteoclast and decreased osteoblasts. According

to Zaviera (2007), age can affect bone density. As we get older, the bone density will decrease as the cells in the body begin to decrease their productivity. So the hormone production required to support bone density is also reduced.

Based on the results of research activity patterns of respondents research consisting of exercise and doing daily work ≥ 30 minutes. The pattern of sports activity on the majority implant acceptor exercises at least 30 minutes a day. Patterns of sports activities in a day include the types of sports gymnastics, aerobics, cycling, jogging, morning walks, jogging and swimming. The result of statistical test with Chi square test, p = 0,001 (p <0,005), then there is statistically significant difference of sports activity pattern between implants acceptor group and non hormonal acceptor group. Activity patterns besides doing sports can also be seen from activities doing daily work such as housework sweeping, washing, mopping, cooking etc. and working outdoors. Based on the results obtained all the respondents (100%) both from the group of acceptors of implants and non-hormonal acceptors perform activities / daily work. According to Zaviera (2007), lack of movement, vitamin D deficiency, and unhealthy lifestyle is a factor of decreased bone mass. Therefore, to prevent the decline in bone mass from an early age, it is necessary to insert a schedule of exercise once a week at the time of 5-8 am given the time, there is exposure to sunlight rich in vitamin D. Bones require stimulation exercises to maintain its strength. Without exercise the bones will lose density and become weak (Kelman, 2005). Based on research conducted by Clark MK et al in 2004 found no significant difference in bone density of DMPA family of users and combination in groups who exercise and those who did not.

Based on the results of research respondents based on coffee drinking habits in the group of implant acceptors mostly did not drink coffee. The result of statistical test with chi square test obtained p = 0,361 (p> 0,05), hence statistically there is no difference of coffee drinking habits between group of implant acceptor and the non hormonal acceptor group. Caffeine consumption is one of the factors affecting decreased bone mineral density (Zaviera, 2007). Caffeine is widely present in coffee and is a popular drink today. On the other hand, such drinks can be healthy for the heart if not excessive in consumption. If excessive in

caffeine consumption should be limited to at least 2 cups in one day to prevent the possibility of adverse effects on caffeine consumption.

Characteristics of respondents based on alcohol drinking habits, based on the results of research that all respondents (100%) both in groups of acceptors of implants and hormonal groups do not have a habit of drinking alcohol. Based on the results of the study, all respondents (100%), both the implants acceptor group and the non-hormonal acceptors, did not have smoking habit. From several studies, smoking may increase the risk of spinal fracture and excessive alcohol consumption (Mundy, 2001).

Based on the results of the study by examining Lumbar Spine L1-L4 bone density in the group of non-hormonal implants and acceptor acceptors, the bone density in the non-hormonal acceptor group was slightly higher than that of the implant group. So is the value of his T-score. While the results of examination of bone density on the left femur neck obtained bone density of the left neck femur in the group of implant acceptor slightly higher than the non-hormonal group.

Air is based on the analysis statistic parametric to determine the differences between the mean T - score of bone density *Lumbar Spine* L1-L4 between the acceptor implants with a group Acceptor of non-hormonal using statistical test *unpaired t-test* showed the *P* value was 0.611 *(P> 0 , 05)* thus H0 is accepted and Ha is rejected. Thus there is no statistically significant difference between the *Lumbar spine L1-L4* bone in the implant acceptor and non hormonal family planning acceptor. Likewise for *unpaired* statistical analysis *T-test* to know difference of average T - score bone density *Femur neck* between group of implant acceptor with group of non hormonal acceptors got result of *P* value is 0,889 (*P* > 0,05) thus H0 accepted and Ha rejected. So statistically there is no significant difference between bone density of Femur neck on implant acceptor and non hormonal acceptor. Implants are a contraceptive containing levonogestrel which is a derivative of the progesterone hormone. In contraceptives containing only progesterone hormones such as implants, it can suppress estrogen production that can cause osteopenia and increase long-term risk of fracture (Westhoff, 2003). Ovarian estrogen production is also suppressed, long-term use has a characteristic plasma estradiol level at or below the current level of the follicular phase. This

relative estrogen deficiency is associated with loss of estrogen inhibition effects on bone resorption, which may have adverse effects on bone mineral density. So the use of hormonal contraceptive that only contains the hormone progesterone can lead to decreased bone mineral density acceptor.

Implant contraceptives containing only the hormone progestin can affect the body's mood to be estrogen deficiency affecting bone mineral density. Mechanism of action Implants suppress ovulation. Implant users had significantly lower serum E2 levels than non-hormonal contraceptive users. This results in a hypoestrogenic atmosphere which ultimately has a negative impact on bone calcium absorption. Bone resorption extends beyond the formation process so that bone mineral formation is impaired and bone mineral density decreases (Cunningham, 2006).

The result of the study that there is no significant difference between T-score of Lumbar spine density L1-L4 and femur neck group of implant acceptor and Non hormonal acceptor group can be caused by the number of few research subjects that is only 30 respondents consisting of 15 groups of implant acceptors and 15 group respondents non hormonal. In addition, based on the characteristics of respondents based on activity, the non hormonal group activity is higher than in the group of implant acceptor. On the implant acceptors are 14 people (93.3%) while those who do not exercise as much as 1 person only (6.7%). While the pattern of sports activity in non hormonal acceptor group as many as 5 people (33.3%) who do sports while those who do not exercise as much as 10 people (66.7%). After statistical test with Chi square test, p = 0,001 (p <0,005) then statistically there is a significant difference of sports activity pattern between implants acceptor group and non hormonal acceptor group. According to Zaviera

(2007), lack of movement, vitamin deficiency, and unhealthy lifestyle is a factor of decreased bone mass. Therefore, to prevent the decline in bone mass from an early age, it is necessary to insert a schedule of exercise once a week at the time of 5-8 am given the time, there is exposure to sunlight rich in vitamin D. Bones require stimulation exercises to maintain its strength. Without exercise the bones will lose density and become weak (Kelman, 2005).

This study has several limitations among the small samples because DMT examination with DEXA requires substantial funding. In addition, this study used cross sectional design with considerable bias considering there are many factors that affect bone mineral density, not just the eyes caused by the use of contraception.

V.   CONCLUSION

Based on the result of the research, it can be concluded that there is no significant difference of Lumbar spine density L1-L4 and Femur neck there are women of child-bearing age of implant acceptor group and non-hormonal acceptor group.

People, especially women, exercise regularly to reduce the risk of fractures in bone resulting from decreased bone mineral density. In addition to women of childbearing age still be careful in using contraceptives, especially those containing only progestin hormones to avoid osteopororis risk, by not too long using the hormonal contraceptive method, with intermittent use of contraceptive methods between hormonal methods and non-hormonal methods. When using long-term progestin hormonal contraceptives to check bone mineral density to determine the risk of bone fracture.

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