

Use of Vaginal Hygiene Product, Physical Activity, Age at Marriage, Body Mass Index, and Female Infertility

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ABSTRACT

Background: Various products are common in the market for vaginal hygiene purpose, such as povidone iodine vaginal douche, extract of betel leaf, and other herbal internal vaginal hygiene products. However, it is hypothesized that these hygiene products may hamper female fertility. This study aimed to examine the effect of vaginal hygiene product use on female fertility, while controlling for the level of physical activity, age at marriage, and body mass index.

Subjects and Method: This was an observational analytic study with case control design. The study was conducted at Dr. Moewardi Hospital, Surakarta, Indonesia. A sampel of 110 women aged 15-49 years old were selected for this study by fixed diseases sampling. This sample consisted of 55 infertile women and 55 pregnant or post-partum women were selected as cases and controls. The dependent variable was infertility. The independent variables were external and internal use of vaginal hygiene product, level of physical activity, age at marriage, and body mass index (BMI). The data were analyzed using a multiple logistic regression.

Results: External use of vaginal hygiene product decreased the risk of infertility, but it was statistically not significant (OR= 0.62; 95%CI= 0.22 to 1.74; p= 0.366). Internal use of vaginal hygiene product (OR= 14.97; 95%CI= 1.66 to 135.16; p= 0.016), heavy physical activity (OR= 7.95; 95%CI= 1.54 to 41.08; p= 0.013), age at marriage ≥ 29 years (OR=3.66; 95%CI= 0.68 to 19.76; p= 0.131), BMI $<18.5\text{kg/m}^2$ (OR= 1.62; 95%CI= 0.31 to 8.56; p= 0.572), and BMI $\geq 25\text{kg/m}^2$ (OR= 23.17; 95%CI= 4.05 to 132.40; p <0.001) increased the risk of infertility.

Conclusion: Internal use of vaginal hygiene product, heavy physical activity, age at marriage >29 years, underweight, and overweight, are risk factors of infertility in women. Women who use vaginal hygiene product internally should be aware that this practice significantly increased the risk of infertility.

Keywords: female infertility, vaginal hygiene product, physical activities, age at marriage, body mass index

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BACKGROUND

Today, many vaginal douche products are offered to women with a safe and useful guarantee to use such as betel leaf extract, feminine hygiene products, internal vaginal hygiene and povidon iodine douching. Women consider vaginal douche products to be safe to use, because there is no clinical evidence and regulation regarding vaginal douche products circulating in the community. Nearly half of women in Yogyakarta

perform vaginal douches with commercial ingredients with femininity and health motivation. The use of vaginal douche products is the process of rinsing or cleaning the external and internal vagina, inserting products or ingredients using water or other products for reasons of cleanliness, preventing infection, preventing vaginal discharge and removing unpleasant odors. The use of these products was found to affect women's reproductive health, including tubal, pelvic

and uterine disfunctions can be caused by sexually transmitted infections (Chlamidia, Gonorrhoea, Pelvic Inflammatory Diseases) (Hull et al., 2011; Carter et al., 2013; Attieh et al., 2016).

Reproductive health is related to good health and function in the vagina. The vagina is susceptible to sexually transmitted infections, which can arise from the habit of rinsing the external vagina using products or commercial products other than using water. Excessive vaginal douching can interfere the natural balance of vaginal flora that can fight pathogens. The structure of the vaginal tissues and vulva is more permeable and hydrated than other skin in the body, resulting in this area susceptible to exposure to toxic chemicals contained in vaginal douche products. There are no natural barriers to the vagina resulting in bacteria and infections can enter the internal vagina and part of the uterus and cause sexually transmitted infections, pelvic inflammatory disease, endometriosis (Scranton, 2013).

A very acidic environment, can significantly reduce sperm life. The vagina has a mechanism to maintain the balance of its chemical state which can cleanse naturally, so the vagina does not need special treatment with soap or commercial products. The American College of Obstetrics and Gynecologists (ACOG) recommends to avoid the use of biological products with the aim of preventing and treating problems with the vaginal vulva. The decision to use vaginal douche products must be made carefully (Scranton, 2013; Anwar, 2014).

On the other hand, many women currently delay marriage and pregnancy until their age are around 30 years, after gaining education and good positions in their jobs (Anwar et al., 2014; Sharma et al., 2013). As a woman's age increases, there will be a tra-

nsition from ovulation to anovulation, due to changes in FSH and LH hormones, resulting in a decrease in the percentage of chances of getting a pregnancy. Ninety-four percent (94%) of women aged 35 years and 77% of women aged 38 years will get a pregnancy within three years of marriage. The chance of pregnancy for women aged 40 years is only 5% per month with a probability of failure of 34-52% (Anwar et al., 2014).

Globalization and modernization make life demands are increasing, making most women dare to make decisions about how to get money to meet their needs, so that more women are working with hard work. Women are not aware that their work can have an impact on their reproductive health. Physical activity includes physical activity while working, traveling (walking or cycling) and leisure activities. Heavy physical activity can cause the menstrual cycle to prolong, prolong the follicular phase and shorten the luteal phase so that it cannot determine ovulation, resulting in ovulation or anovulation and infertility. Physical activity is increasing the chances of getting pregnant (Wise et al., 2012; Sharma et al., 2013).

Many of working women have limited time to prepare nutritious food so that it encourages the consumption of fast food and junk food that tends to be low in vitamins, fiber and minerals but large amounts of salt, fat, additives and sugar. Excess sugar and fat content in these foods can increase the risk of being overweight so that it affects the health of the body (Vogli et al., 2014).

Lifestyle changes and demands have attractive appearance, making the woman trying to have a slim body by way of excessive calorie diet and consumption of slimming drug. Women with underweight, overweight and obese body mass index (BMI) increase the risk of infertility. Women with

underweight have an infertile risk 1.5 times higher than women with normal BMI. Underweight causes inadequate nutrition intake resulting in decreased function of Gonadotropin Releasing Hormone (GnRH) causing anovulation (Cong et al., 2016).

Obesity in women has a 2.3 fold higher risk than women with normal BMI. Obese women experience sexual dysfunction which can cause infertility. In obese women there is insulin resistance and hyperinsulinemia which causes a decrease in the production of sex hormones that bind globulin in the liver, and an increase in androgen hormone and suppresses Follicle Stimulating Hormone (FSH) which is released by the pituitary strain which inhibits follicle formation and ovulation which can lead to polycystic ovary syndrome. Irregular menstruation is a manifestation that is often experienced in obese women. An average weight loss of 10.2 kg can restore the possibility of ovulation and pregnancy, reduce insulin levels, reduce testosterone, increase sex hormones that bind globulin (Pandey et al., 2010; Jamali et al., 2014; Best and Bhattacharya, 2015; Khademi et al., 2010; Cong et al., 2016).

The absence of children or infertility is a crisis in life that will affect various aspects of the life of a married couple trying to get pregnant. Infertility carries psychological implications for women such as feelings of sadness, anxiety and concern related to the nature of conceiving and childbearing. Psychological implications for men include concerned about facing old age, because children are a reflection of virility, male sexual strength and capacity, so men feel low when they do not have children (Khomami et al., 2015).

The World Health Organization (WHO) estimates that around 186 million couples of childbearing age or one in four couples in developing countries have diffic-

ulty getting offspring or infertility. This infertility problem worries a married couple and their families (WHO, 2012). Anwar et al. (2014) explained that infertility is caused by 35% of men, 55% of women and 10% are unknown. In the past year (October 2015-September 2016) the number of new fertility clinic patients at Dr. Moewardi Hospital Surakarta was 1,083 infertile couples from a total of 3,774 infertile couples, and most of them were diagnosed with female infertility.

Infertility in women is the inability of women to get a pregnancy at least 12 months of regular sexual intercourse (2-3 times per week) without using contraception. Factors that cause infertility in women are problems with reproductive organs; 36% of fallopian tube disorders or ovarian ducts, 33% of ovulation disorders, 6% of uterine disorders and 25% unknown (In Vitro Indonesia Fertilization Association, 2015; Anwar, 2014; Jamali et al., 2014; Best and Bhattacharya, 2015; Wise et al., 2012; Sharma et al., 2013).

The impact of infertility that has the potential to become a public health problem in the future makes it necessary for attention and preventive follow-up. Limited study related to infertility risk factors in Indonesia, prompted the authors to conduct a study to analyze the effect of vaginal douche product use, physical activity, age at marriage and body mass index of infertility on women. This study is expected to be a reference for prevention since adolescence, supervision of vaginal douche products and improvement of family planning programs to reduce the prevalence of infertility and improve the quality of life.

SUBJECTS AND METHOD

1. Study Design

This was observational analytic study with case control design, conducted at Dr. Moe-

wardi Hospital, Surakarta from August to September 2016.

2. Population and Sampling

The study population was all women of childbearing age in Dr.Moewardi Hospital, Surakarta. A sample of 110 women was selected by fixed diseases sampling, consisting of 55 infertile women as case group and 55 pregnant or post-partum as a control group.

3. Study Variabel

The dependent variable is infertility in women. Independent variables were vaginal douche product use, physical activity, age at marriage, and body mass index

4. Study Instruments

The measuring instruments used were microtoise, body scales, MCH books, doctor diagnosis in the patient medical record, vaginal douche habit questionnaire (such as betel leaf extract, feminine hygiene products, intravaginal hygiene herbal products and povidone iodine douching) and physical activity questionnaire Baecke (Baecke et al., 1982).

5. Data Analysis

Data were analyzed by univariate and bivariate using Chi Square. Multivariate analysis with multiple logistic regression using STATA 13 program. The significance of statistics on Odds Ratio (OR) was analyzed using Wald test, the test results were indicated by p value (Murti, 2013).

RESULTS

1. Study Subjects Characteristics

Table 1 shows the characteristics of the study subjects based on the length of trying to get pregnant, the normal category as much as 50% and the late category (> 1 to 3 years) which is 21.8%. Most of the study subjects

with high school education level were 40.9% and 58.2% worked as private employees.

Women performed external vaginal douches using only 29.1% of water with hygiene and habit goals 45.5%, eliminated unpleasant odors 22.8%, but there were 10% of women doing internal vaginal douch, for reasons of cleanliness and habits 4.5%, promotion or mass media 3.6%.

Table 2 shows that most of the study subjects performed external vaginal douch using commercial products (58.3%), heavy physical activity (56.4%) with normal BMI (50%), underweight BMI (20.9%), overweight BMI (29.1%), married and plan for pregnancy at the age of 25-29 years (42.7%).

2. Bivariate Analysis

Table 3 shows that there was a moderate negative effect and was not statistically significant between the use of external vaginal douche products with infertility in women. The use of external vaginal douche products reduced the chance of infertility 0.64 times than not using external vaginal douche products (water only).

There was a strong positive effect but it was not statistically significant between the use of internal vaginal douche products with infertility in women. The use of internal vaginal douche products increases the chance of infertility 3.24 times than not using external vaginal douche products (water only).

There was a weak positive effect but it was not statistically significant between physical activities with infertility in women. Heavy physical activity increased 1.25 times the chance of infertility than light and moderate physical activity.

Table 1. The frequency distribution characteristics of the study subjects

Characteristics	Category	n	%
Length of time to get pregnant	Normal		
	≤ 1 year	55	50
	Take a long time		
	> 1 – 3 year	24	21.8
	> 3 – 6 year	17	15.4
	> 6 – 10 year	9	8.2
	> 10 year	5	4.6
Education level	Primary and middle school	17	15.4
	High School	45	40.9
	Associate degree	7	6.4
	Bachelor's degree	34	30.9
	Master's degree	7	6.4
Occupation	Housewife	26	23.6
	Private employee	64	58.2
	entrepreneur	8	7.3
	Government employee	12	10.9
Vaginal hygiene product	Internal douches		
	Herbal intravaginal hygiene	11	10
	Povidon iodine douching	3	2.7
	External vaginal douches		
	Water	32	29.1
	Water and soap	9	8.2
	Feminine hygiene product	30	27.3
Betel leaf extract	25	22.7	
Reasons for vaginal douche	Internal vaginal douches		
	Cleanliness/habits	5	4.5
	Prevent infection/fluorine albus	3	2.7
	Promotion or mass media	4	3.6
	Eliminate bad odors	2	1.8
	External douches		
	Cleanliness/habits	50	45.5
	Prevent infection/fluorine albus	21	19.1
Eliminate bad odors	25	22.8	

Table 2. The frequency distribution characteristics of study subjects

Independent Variable	Category	n	%
Use of vaginal rinse products	Douche the internal vagina (using commercial products)	14	12.7
	Douche the external vagina (using commercial products)	64	58.3
	Douche the external vagina (using water only)	32	29
Physical activities	Light	2	1.8
	Moderate	47	42.8
	Heavy	62	56.4
Age at marriage and pregnancy planning	Age < 20 year	11	10
	Age 20 – 24 year	41	37.3
	Age 25 – 29 year	47	42.7
	Age 30 – 34 year	5	4.5
	Age ≥34 year	6	5.5
Body mass index	Underweight (<18.5kg/m ²)	23	20.9
	Normal (18.5-24.99kg/m ²)	55	50
	Overweight (≥25kg/m ²)	32	29.1

Table 3. Chi Square test results factors affecting infertility in women

Group variable	Infertility in women			OR	95% CI		p
	Fertil	Infertil	Total		Lower Limit	Upper Limit	
Use of vaginal douche products :							
External Vagina Douche	52(54.2%)	44(45.8%)	96 (100%)	0.64	0.27	1.51	0.311
Internal Vagina Douche	3(21.4%)	11(78.6%)	14 (100%)	3.24	0.76	13.84	0.104
Physical Activity :							
Heavy physical activity	29(47.5%)	32(52.5%)	61 (100%)	1.25	0.58	2.64	0.565
Light and moderate physical activity	26(53.1%)	23(46.9%)	49 (100%)				
Age at marriage :							
Age over 29 years	3(27.3%)	8(72.7%)	11 (100%)	2.95	0.73	11.77	0.112
Age 18 - 29 years	52(52.5%)	47(47.5%)	99 (100%)				
Body Mass Index :							
Overweight BMI	6(6.9%)	26(29.9%)	32 (36.8%)	5.60	1.99	15.76	0.001
Underweight BMI	18(23.1%)	5(6.4%)	23 (29.5%)	0.36	0.12	1.11	0.068
Normal BMI	31(56.4%)	24(43.6%)	55 (100%)				

There was a moderate positive effect but was not statistically significant between the age of marriage and female infertility. Women who were married at the age of 29 years or more, increased the chance of infertility 2.95 times than women who were married at the age of 18-29 years.

There was a moderate negative effect and was not statistically significant between underweight BMI and infertility in women. Underweight BMI (<18.5 kg/m²) reduced the chance of infertility 0.36 times than women with normal BMI (18.5 to 24.99 kg/m²). There was a strong positive effect and statistically significant between overweight BMI and infertility in women. Overweight BMI (≥25 kg/m²) increased the chance of infertility 5.6 times than in women with normal BMI.

3. Multiple Logistic Regression

Based on the results of multiple logistic regression above there was no significant effect between the use of external vaginal douche products, age at marriage and underweight BMI (<18.5kg/m²) with inferiority in women. However, there was a significant effect between overweight BMI (≥25 kg/m²), use of internal vaginal douche products, heavy physical activity to infertility in women.

In the results of the Stata analysis above, the OR value informed the effect of the independent variable on the dependent variable. If the OR was one "1" that meant there was no influence for infertility. The Pseudo R² value was 25% indicated that the multi-variance analysis used a dependent test that could be explained by an independent variable of 25% while the remaining 75% was explained by other variables outside the independent variables studied.

Table 4. The results of multiple logistic regression analysis of risk factors for infertility in women

Independent Variable	OR	95% CI		P
		Lower limit	Upper limit	
Use of Vaginal Rinse Products				
External Vaginal Douche with Products	0.62	0.22	1.74	0.366
Internal Vaginal Douche with Products	14.97	1.66	135.16	0.016
Heavy Physical Activity	7.95	1.54	41.08	0.013
Age at marriage (>29 year)	3.66	0.68	19.76	0.131
Body Mass Index (BMI)				
Underweight BMI (<18,5kg/m ²)	1.62	0.31	8.56	0.572
Overweight BMI (≥25 kg/m ²)	23.17	4.05	132.40	<0.001
N Observasi = 110				
Pseudo R ² = 25%				

Table 4 showed the use of external vaginal rinse douche reduced the risk of infertility 0.62 times than rinsing external vagina using water alone (OR= 0.62; 95% CI= 0.22 to 1.74; p= 0.366).

The use of internal vaginal douche products increased 14.97 times the chance of female infertility than just douching the external vagina with water alone, and was statistically significant (OR= 14.97; 95% CI= 1.66 to 135.16; p= 0.016). Heavy physical activity could increase 7.95 times the risk of female infertility than moderate moderate physical activity and was statistically significant (OR= 7.95; 95% CI= 1.54 to 41.08; p= 0.013).

Women who married at the age of 29 years or more had a risk of infertility 3.66 times higher than women who were married at the age of 18-29 years, but it were not statistically significant (OR= 3.66; 95% CI= 0.68 to 19.76; p= 0.131). Women with a underweight body mass index (BMI) (<18.5 kg/m²) had a risk of 1.62 times for infertility than women with a normal BMI (18.5-24.99 kg/m²) and were not statistically significant (OR= 1.62; 95 % CI= 0.31 to 8.56; p= 0.572).

Women with overweight BMI (≥25 kg/m²) had a 23.17 times higher risk of infertility than women with normal BMI

and were statistically significant (OR= 23.17; CI 95%= 4.05 to 132.40; p <0.001).

DISCUSSION

1. The Effect of Use Vaginal Hygiene Products on the Risk Factor for Infertility in Women

The use of external vaginal douche products reduced the risk of infertility 0.62 times than external vaginal douche using water alone, there was a moderate negative effect and was not statistically significant between the use of external vaginal douche products with infertility in women (OR= 0.62; 95% CI= 0.22 to 1.74 ; p= 0.366).

The results of this study was not in accordance with a study conducted by Joesoef et al. (1996) entitled "Douching and sexually transmitted diseases in pregnant women in Surabaya, Indonesia" that showed that women cleaned their vagina with 19% water, 63% water and soap, 8% betel leaf extract and 2% commercial products. In the use of water and soap there was an increased risk of Sexually Transmitted Diseases (STDs) such as gonorrhea, chlamydia, syphilis, trichomoniasis, type 2 HPV 2.6 times and 5.2 times when using betel leaves or commercial products. Douching the vagina with water alone was not associated to STDs.

Based on the results of this study, the use of external vaginal douche products was

better than not using external vaginal douche products, but the decision to use external vaginal douche products should be made carefully and not recommended for daily use, except for medical reasons and medical prescriptions.

Excessive vaginal flushing can interfere the natural balance of vaginal flora that can fight disease-causing bacteria. The structure of the vaginal tissues and vulva is more permeable and hydrated than other skin in the body, resulting in this area being susceptible to exposure to toxic chemicals contained in vaginal douche products. The walls of the vagina or circular folds of rugae can directly transfer the chemicals contained in the vaginal douche product throughout the body without going through metabolism. For example, when estrogen is inserted through the vagina, its effectiveness increases 10-80 times compared to the same dose administered orally. The decision to use vaginal douche products must be made carefully (Scranton, 2013).

Scranton (2013) mentions several ways to reduce chemical exposure in vaginal rinse products as follows. (1) Avoid unnecessary vaginal douche products to maintain vaginal health; (2) Choose unscented, chlorine-free and bleach vaginal douche products; (3) Read the vaginal douche product label to prevent any negative effects on the vaginal vulva; (4) Choose a product that includes the composition of ingredients including perfume ingredients; (5) Discuss with health care providers about the impact of using vaginal douche products on health.

The use of internal vaginal douche products increased the chance of infertility 14.97 times than external vaginal douche using water alone. There was a very strong and statistically significant positive effect between the use of internal vaginal douche

products with infertility in women (OR= 14.97; 95% CI= 1.66 to 135.16 ; p= 0.016).

The results of this study was in accordance with a study conducted by Baird et al., (1996) entitled "Vaginal Douching and Reduces Fertility" showed that women who douche regularly (more than once a week) 27% had not become pregnant after a year. Women who douched more than twice a year but not more than once a week 24% had not become pregnant after a year. Unlike women who had never or rarely douched only about 10% had not been pregnant after a year.

Fashemi et al., (2013) explained that vaginal douche products can suppress lactobacillus growth in 2 hours and kill all bacteria within 24 hours, thus changing the immune environment of the vagina.

Based on Table 3, it was explained that most women performed external vaginal douche using only water 29.1%, for hygiene purposes or habits 45.5% and to eliminate odor 22.8%, but there were 10% of women performed internal vaginal douche, for cleanliness/habit 4.5%, promotion or mass media campaigns 3.6%.

The above result was in accordance with a study of Yanikkerem and Yasayan (2016) entitled "Vaginal Douching Practice: Frequency, Associated Factors and Relationship with Vulvovaginal Symptoms" and a study of Brown et.al (2016) entitled Motivations for Intravaginal Product Use among a Cohort of Women in Los Angeles" which stated that the reasons for using internal vaginal douche included hygiene, preventing genital infections, cleaning before or after sexual intercourse, during menstruation, preventing vaginal discharge, reducing odor and trust.

2. The Effect of Heavy Physical Activity on the Risk Factor for Infertility in Women

Heavy physical activity increased the 7.95 times risk of infertility than women with mild and moderate physical activity. There was a strong positive effect and was statistically significant between heavy physical activity and infertility in women (OR= 7.95; 95% CI = 1.54 hinges 41.08; p= 0.013).

This was in line with the results of Gudmundsdottir's (2009) study entitled "Physical activity and fertility in women: the North-Trøndelag Health Study" explained that women with heavy physical activity increased 2.3 times the incidence of fertility disorders compared to women with mild physical activity. Heavy physical activity can cause the menstrual cycle to prolong, prolong the follicular phase and shorten the luteal phase so that it cannot determine ovulation, resulting in ovulation or anovulation and infertility. Physical activity is increasing the chances of getting a pregnancy (Wise et al., 2012; Sharma et al., 2013).

3. The Effect of Age at Marriage on the Risk Factor for Infertility in Women

Women who were married at age 29 or older had a risk of infertility 3.66 times higher than women who were married at age 18-29 years, and there was a strong positive effect but statistically insignificant between the ages of marriage to infertility in women (OR= 3.66; 95% CI= 0.68 to 19.76; p= 0.131).

As the wife's age increases, there would be a transition from ovulation to anovulation, due to changes in FSH and LH hormones, resulting in a decrease in the percentage of chances of getting a pregnancy. Ninety-four percent of women aged 35 years and 77% of women aged 38 years will get a pregnancy within three years of marriage. The chance of pregnancy for a 40-year-old

woman is 5% per month with a probability of failure of 34-52% (Anwar et al., 2014).

The results of this study was in accordance with a study conducted Cheung (2011) that explained health care providers should provide information to women aged 20-30 years about the relationship between age with ovarian aging associated with decreased fertility, and an increased risk of infertility in the late 30s.

Women with an underweight BMI (<18.5kg/m²) (OR = 1.62; CI95% = 0.31 to 8.56; p = 0.572), overweight BMI (≥ 25 kg/m²) (OR = 23.17; CI 95% = 4.05 to 132.40; p <0.001) increased the risk of infertility higher than women with normal BMI (18.5-24.99 kg/m²).

4. The Effect of Age Body Mass Index on the Risk Factor for Infertility in Women

The results was in line with Cong's (2016) study entitled "Prevalence and Risk Factors of Infertility at a Rural Site of Northern China" that explained underweight women (BMI <18.5 kg/m²) increased 1.5 times the risk of infertility compared to women with a normal body mass index (BMI 18.50-24.99 kg/m²). Study by Best and Bhattacharya (2015), Rich-Edward (2002) and Jamali et al. (2014) state that obesity in women is associated with anovulation and has a negative effect on women's sexual function. Infertility associated with ovulation factors is 12% due to underweight and 25% due to overweight. Weight loss can increase the change of conception.

In obese women there is insulin resistance and hyperinsulinemia which causes a decrease in the production of sex hormones that bind globulin to the liver. So, there is an increase in the androgen hormone and suppresses Follicle Stimulating Hormone (FSH) which is released by the pituitary strain. This causes inhibition of follicular formation and ovulation which can lead to

anovulation. Irregular menstruation is a manifestation that is often experienced in obese women (Pandey et al., 2010; Jamali et al., 2014; Best and Bhattacharya, 2015). An average weight loss of 10.2 kg can restore the possibility of ovulation and pregnancy, reduce insulin and testosterone levels, increase sex hormones that bind globulin (Khademi et al., 2010; Cong et al., 2016).

From this study, it can be concluded that the use of internal vaginal douche products, heavy physical activity and underweight or overweight body mass index have a strong positive effect and statistically significantly increase the risk of infertility in women.

Limitations in this study included: (1) Variable use of vaginal douche products had not considered the frequency and intensity of the use of vaginal douche products; (2) The results of multiple logistic regression tests showed the precision or range of values of the lower and upper limits. Precision could be increased in several ways, namely: (a) increasing sample size; (b) designing studies with different methods so that information was as accurate as possible.

The results of this study recommended that the decision to use external vaginal douche products had to be done carefully by medical personnel, according to the doctor's prescription and for medical reasons. External vaginal douche products were not recommended for use as part of daily genital hygiene. Internal vaginal douche products were not recommended for use. Lifestyle behavioral control related to weight gain, physical activity, and determination of age at marriage and planning a pregnancy needed to be considered to maintain reproductive health for women of childbearing age related to fertility and avoid infertility.

Suggestions that can be given based on the results of this study are, the need for

regulation and supervision of vaginal douche products, and counseling to adolescents and women of childbearing age related to the dangers of using vaginal douche products without medical indications. Further research needs to be done by considering the intermediate variables, improving the limitations of this research and using cross-disciplines, such as psychology, nutrition, environment, and others.

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