The Stress Hormones *Adreno Cortico Tropin*, *Cortisol*, *Catecholamines* and Pregnancy Exercises for Childbirth

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Abstract: During pregnancy there are safe changes both physically and psychologically. Mothers who experience anxiety and stress, the signal travels through the Hypothalamo-Pituitary-Adrenal (HPA) which can cause the release of stress hormones including Adreno Cortico Tropin Hormone (ACTH), cortisol and catecholamines. The release of stress hormones in pregnant women results in systemic vasoconstriction, including placental vasa utero constriction which causes impaired blood flow in the uterus, so that oxygen transport into the myometrium is disrupted and results in weak uterine muscle contractions. This study aims to determine the effectiveness of pregnant gymnastics has a relationship with anxiety levels as a prenatal service in reducing anxiety facing first labour. The type of research used in this study is the Quasi Experiment method. The type of research used in this study is experimental research, which is a research procedure carried out by providing treatment / intervention on research subjects, with the aim of assessing the effect of a treatment on the independent variable on the dependent variable. The results of the study indicate that pregnant gymnastics as a prenatal service is effective in reducing anxiety facing the first childbirth, this can be seen from the results before and after the treatment and prenatal service of pregnant gymnastics.

Keywords: Adreno Cortico Tropin; Childbirth; Stress Hormones; Pregnancy Exercises

Introduction

Pregnancy is a sensitive period for women in their life cycle. Hormonal changes as a result of adaptation to fetal growth and development in the womb result in physical and psychological changes (Bjelica et al., 2018; Murray & Hendley, 2020). Physical and psychological changes during pregnancy can be a stressor that causes anxiety in pregnant women (Effati-Daryani et al., 2020).

During pregnancy, changes occur both physically and psychologically (Slade et al., 2009). Mothers who experience anxiety and stress, the signal travels through the Hypothalamo-Pituitary-Adrenal (HPA) which can cause the release of stress hormones including Adreno Cortico Tropin Hormon (ACTH) (Sheng et al., 2021), cortisol and catecholamines. The release of these stress hormones causes systemic vasoconstriction (Daiber et al., 2019; Rosenfeld et al., 1998; Siefkes & Lakshminrusimha, 2021), including constriction of the vasa utero placenta which causes impaired blood flow in the uterus, so that oxygen transport into the myometrium is disrupted and results in weak uterine muscle contractions. This event causes the length of the labour process (long partus) so that the fetus can experience fetal distress (Amalia et al., 2020).

Psychological changes in third trimester pregnant women are more complex and increase again from the previous trimester (Ertmann et al., 2023; Westerneng et al., 2019). This is because the condition of pregnancy is getting bigger, especially in primigravida mothers. Many new things are felt by primigravida mothers during pregnancy, physical changes, role changes, the absence of pregnancy and childbirth experience can make first pregnant women sometimes difficult to adapt and trigger anxiety (Hore et al., 2019; Rodríguez-Almagro et al., 2019). The condition is not uncommon to

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bring up problems such as uncomfortable sleeping positions and easily attacked by fatigue or a fluactive emotional state (Koc et al., 2021).

Pregnancy anxiety is proven to be reduced or eliminated through physical exercise (physical exercise) (Putri, 2019). A form of physical exercise that is a self help solution is practicing pregnant exercises that support the process of pregnancy, birth and even parenting which can be done in antenatal classes. One of the pregnant exercises is yoga (Yuniarti & Eliana, 2020).

By following pregnant exercises regularly and intensively, the pregnant woman will maintain optimal health of the body and the fetus she is carrying. Pregnant women who do pregnant exercises regularly will contract their pregnancy well, rhythmically and strongly (Nadrah, 2020). Therefore, to reduce anxiety in the first pregnancy, pregnant exercises can reduce the incidence of fetal distress and anxiety. Pregnant gymnastics is one of the physical exercise programs for pregnant women, pregnant gymnastics aims to prepare the mother's physical condition during pregnancy and prepare for childbirth (Fahriani et al., 2020). Furthermore, pregnant gymnastics is also to maintain the muscles and joints that play a role in the delivery process, and to foster self-confidence and strengthen mentally (Fahriani et al., 2020).

The level of anxiety experienced by TM III pregnant women when they will face the process of childbirth is 47.7% severe anxiety, 16.9% moderate anxiety and 35.4% mild anxiety (Darma et al., 2023). Data from the Indonesian Ministry of Health in 2018 the number of pregnant women in Indonesia was 5,291. 143 people and in 2019 in Indonesia as many as 5,256. 438 people. The number of pregnant women in South Sumatra in 2018 was 177,726 people and in 2019 was 175,899 people While the entire population on the island of Java there are 679,765 pregnant women who experience anxiety in the face of childbirth, namely 355,873 people (52.3%) (Indonesian Ministry of Health, 2020).

Based on anxiety data according to WHO and data in Indonesia that there is still a high rate of anxiety for pregnant women and then the researcher formulates the problem in this study is whether the effectiveness of pregnant exercises can reduce anxiety in the face of the first childbirth, therefore the author wants to examine the effectiveness of whether pregnant exercises can be a prenatal service in reducing anxiety facing the first childbirth.

Method

Research Design

The type of research used in this study is the Quasi Experiment method. The type of research used in this study is experimental research, which is a research procedure carried out by providing treatment/intervention on research subjects, with the aim of assessing the effect of a treatment on the independent variable on the dependent variable. This research design uses Quasi Experimental (pseudo experiment) without comparison or pretend experiment, with the design used is post test only control group design. Quasi experimental research designs are often used in field research or in the community. In this research design there are no strict restrictions on randomisation and at the same time can control validity threats (Masturah & Anggita, 2018). Where it aims to get whether pregnant gymnastics is effective as a prenatal service in reducing anxiety facing first childbirth.

Population and Research Sample

Population is the entire collection of elements of similar research objects, whose characteristics will be studied. The elements of the research object can be in the form of humans, living things, inanimate objects, or abstract objects. The population of this study were Primigravida Trimester III pregnant women in the area at the Healthy Insani Main Clinic PIK North Jakarta, at the Kresek Health Centre, Tanggerang Banten Regency, Al- Barroh Main Clinic, Kayu Agung, South Sumatra, Az-Zahra Primary Clinic, South Jakarta.

The sample is part of the population to be studied or part of the number of characteristics possessed by the population. The sample in this study were third trimester pregnant women who checked their pregnancy at the Main Clinic of Sehat Insani PIK North Jakarta, pregnancy health centre at Puskesmas Kresek, Tanggerang Regency, Banten, Al- Barroh Main Clinic Kayu Agung South Sumatra, Az-Zahra Primary Clinic South Jakarta in July-August 2023. The number of samples in this study was 50 people consisting of 25 experimental groups and 25 control groups.

Data types and analysis techniques

The data to be collected in this study consists of two types, namely primary data and secondary data. Primary data is data collected directly from respondents (Tsegaye et al., 2020), namely by observing pregnant women directly in doing pregnancy exercises at the Main Clinic of Sehat Insani PIK North Jakarta.

Data Processing Technique

In order for this research to produce correct information, data processing will be carried out with the recommended stages (Masturah & Anggita, 2018), namely: Data Processing (Editing), Editing is re-examining whether the medical record is complete or not so that if there is a shortage it can be completed immediately. Coding (Coding), Coding is the activity of

converting letter-shaped data into number-shaped data to facilitate data analysis and also speed up data entry Entry, After the two activities above are completed and correct, the next step is to process the data so that it can be analysed. Processing the data is done by entering data from the questionnaire into the computer program package. Data Tabulation, data tabulation is to make a presentation of data, in accordance with the research objectives. Data cleaning, Cleaning is an activity of checking the data that has been entered whether the data entered has errors or not. Processing, processing is the process after all questionnaires are fully and correctly filled in and the respondents' answers to the questionnaire have been coded into the data processing application on the computer. There are various applications that can be used for data processing, including: SPSS, STATA, EPI-INPO, and others. One programme that is widely known and relatively easy to use is SPSS (Statistical Package for Social Sciences).

Result and Discussion

Research Results
Univariate Analysis

Based on the purpose of conducting Univariate Analysis is to describe each variable studied. The following univariate analysis will show the results of the frequency distribution of each variable, namely the dependent variable and the independent variable.

Table 1. Distribution of Anxiety Levels in the Intervention Group and Control Group of the Main Healthy Insani Clinic PIK North Jakarta.

Group	Min Value	Max Value	Average
Pretest of Anxiety	29	37	83.2
Posttest Anxiety	21	30	61.7
Control Anxiety	29	49	90.5

Table 1 shows that the characteristics of pregnant women in the control group (90.5) have a high risk of anxiety compared to the intervention class, this can be seen in the pre-test results of the intervention class which has a frequency of 83.2 but after being given counseling and pregnant gymnastics treatment, it is reduced to 61.7. It is supported by the results of the normality test which is carried out to check whether our research data comes from a normally distributed population. This test needs to be done because all parametric statistical calculations have the assumption of normality of distribution.

Table 2. The normality test result

Variable	Sig	limit	Remark
Pretest Anxiety	0.341	> 0.05	Normal
Post test Anxiety	0.64	>0.05	Normal
Control Anxiety	0.395	>0.05	Normal

Bivariate Research Results
Anxiety Level between Control Group and Post-test

T-Test or T-Test is one type of parametric statistical test used to test significance and relevance in one or two sample groups. The t-test in one group uses One sample T-Test while the two-group t-test is divided into two types, namely Independent Sample T-Test and Paired Sample T-Test. Independent Sample T-Test is used to test two groups of samples that are not related and Paired Sample T-Test is used to test two groups of samples that have a correlation.

Table 3. T-Test results

Group	Total	Average Value
Control	25	36.2
Post test	25	24.6

Based on table above of the T-test output above, it is known that the number of data on the anxiety level of the Control group is 25 people and the Intervention / Posttest group is 25 people. The value of the average anxiety level for the control group is 36.2 and the post test group is 24.6. Thus descriptive statistics can be concluded that there is a difference in the average results of the anxiety level of the control group and the post test / intervention group. Then to prove whether the difference between the control group and the post test group is significant or not, it is necessary to interpret the next output using the following independent sample test:

Table 4. Frequency Distribution of Anxiety

Lavene statistic	Sig 2 Tailed	Mean difference
0.002	0.001	11. 520

Based on the Table 4, it is known that the significance value. 0.002 < 0.05, it means that the data variance between the Control group and the Posttest group is the same. The significance value (2-tailed) <0.05 above shows that there is a significant difference between the initial variable and the final variable. This shows that there is a significant effect on the difference in treatment given to each variable. So that the interpretation of the independent samples test output table is guided by the value in the table "equal variances assumed. Based on the "equal variances assumed" output table, it is known that the sig. (2 tailed) of 0.001 <0.05, it can be concluded that there is a significant difference between the control class anxiety level and the

post test anxiety level. Furthermore, from the output table, it is known that the value of "mean difference" is 11. 520 which shows the value of the difference between the average level of maternal anxiety in the control group and the level of maternal anxiety in the post test group.

Anxiety Level Between Pretest and Posttest Groups

Paired sample t-test is one of the testing methods used to assess the effectiveness of treatment, marked by differences in the average before and average after treatment, so in this study the following results were obtained:

Table 5. Paired Sample Statistic

Pair 1	Group	Average Value	Stnd Dev.	Stnd error
	Pretest Anxiety	33.28	21.893	0.4378
	Post test Anxiety	24.68	22.861	0.4572

The Table 5 shows the descriptive value of each variable in paired samples, namely in the initial test has an average value of 33.28 with a standard deviation of 2.189 and a standard error of 0.4378 and in the final test has an average value of 24.68 with a standard deviation of 22.861 and a standard error of 0.4572 from 25 data / respondents. This shows that the initial test on the level of anxiety in mothers facing childbirth in the data is higher than the final test, which means that the level of anxiety is reduced after the treatment, namely prenatal education about pregnant gymnastics.

Table 6. Paired Sample Correlation

Group	Respondent	Correlation	Sig
Pretest & Post test Anxiety	25	0.427	0.203

The Paired Samples Correlations table shows the correlation value that indicates the relationship between the two variables in the paired sample. This is obtained from the bivariate Pearson correlation coefficient (with a two-sided significance test) for each pair of variables entered. The table 6 shows the results of the correlation test or the relationship between the pre test variable and the Post Test variable. Based on the output above, it is known that the correlation coefficient (Correlation) value is 0.427 with a significance value (Sig.) of 0.203. Because the value of Sig. 0.203> probability 0.05, it can be said that there is no relationship between the Pre Test variable and the Post Test variable. According to Santoso (2020), the decision-making guidelines in the paired sample t-test test based on the significance value (Sig.) of the SPSS output results, are as follows.

Table 7. Paired Sample Test Output

Gruop	Mean	Sig 2 tailed	95% Confidence Interval of the Difference	
			Lower	Upper
Pretest & Post test Anxiety	8.600.000	0.002	7.60109	9.5898.

Based on the "Paired Samples Test" output table above, it is known that the Sig. (2-tailed) is 0.002 <0.05, then Ho is rejected and Ha is accepted. So it can be concluded that there is an average difference between the Pre Test and Post Test anxiety levels, which means that there is effectiveness in pregnant gymnastics as a prenatal service in reducing anxiety facing first childbirth at the Healthy Insani Main Clinic PIK North Jakarta.

From the "Paired Samples Test" output table above also contains information about the value of "Mean Paired Differences" is 8,600,000. This value shows the difference between the average results of the Pre Test anxiety level and the average Post Test anxiety level and the difference between 7.60109 to 9.5898. (Confidence Interval of the Difference Lower and Upper).

Discussion

This chapter will describe the discussion which includes the results of the research previously described in the previous chapter, the limitations of the research related to the research design used and the characteristics of the sample used and will also discuss the implications of the research results for services and research. This study aims to determine the "Effectiveness of Pregnant Gymnastics as Prenatal Services in Reducing Anxiety Facing First Labour" with several variables that will be discussed in detail in this chapter:

Effectiveness of Pregnant Gymnastics as a Prenatal Service in Lowering Anxiety Facing First Labour

Anxiety in pregnant women is a unique psychological state, but it occurs because it is influenced by increased hormones during pregnancy, and is also exacerbated by external stressors (Grant & Erickson, 2022; Traylor et al., 2020). This can have a negative impact on the mother and foetus if not addressed properly. The results of the bivariate test show that the characteristics of pregnant women in the control group category have a high risk of anxiety compared to the intervention class. This can be seen in the pre-test of the intervention class has a high number of frequencies, but after being given counseling and pregnant gymnastics treatment to pregnant women, anxiety can be reduced. In the normality test, all data are normally distributed, which has a value greater than 0.05.

Pregnancy gymnastics can be useful for pregnant women to master breathing techniques (Szumilewicz et al., 2019; Szumilewicz & Santos-Rocha, 2022). This breathing technique is trained so that mothers are better prepared for labour. Good breathing techniques, the breathing pattern in pregnant women becomes better and more regular so that it can give pregnant women a feeling of relaxation (Atilgan & Tuncer, 2021; Vural & Aslan, 2019). Relaxation will inhibit the increased work of sympathetic autonomic nerves, so that the parasympathetic nervous system which has the opposite work function to sympathetic nerves (Liu et al., 2023; Waxenbaum et al., 2019).

This can then reduce the adrenaline hormone so that there is a decrease in heart rate, breathing rhythm, blood pressure, muscle tension, metabolic rate and production of stress-causing hormones which causes pregnant women to become calmer along with decreasing anxiety symptoms. When the anxiety level in pregnant women decreases, it will provide enthusiasm to face the labour process in pregnant women. Then the study found that pregnant women who experience anxiety increase the level of cortisol in the fetal cord blood and can regulate growth.

From the results of the bivariate test in this study conducted at the Utama Sehat Insani PIK North Jakarta clinic, at the Kresek Health Centre, Tanggerang Banten Regency, Al- Barroh Utama Clinic, Kayu Agung, South Sumatra and Az-Zahra Pratama Clinic, South Jakarta, it can be concluded that there is an average difference in the results of the anxiety level of the control group and the post test group. which can be seen from the results of the independent sample test which is known that the significance value has a value less than 0.05, it can be interpreted that the data variance between the control group and the post test group is the same.

Based on the output table "equal variances assumed", it is known that the sig value obtained is less than 0.05, so it can be concluded that there is a significant difference between the anxiety level of the control class and the post test anxiety level. Furthermore, from the output table, it is known that the "mean difference" value shows the difference between the average level of maternal anxiety in the control group and the level of maternal anxiety in the post test group.

From the results of the statistical test between the pretest and post test groups, it shows that the initial test on the level of anxiety in the data is higher than the final test, which means that the level of anxiety is reduced after the pregnant gymnastics performed by pregnant women before facing the first childbirth, then pregnant gymnastics is effective in reducing anxiety as a prenatal service in facing the first childbirth, so it can be concluded that Ha is accepted.

This research is in line with research conducted by nuristiana rifaI with the title of the effect of pregnant gymnastics on anxiety levels facing the process of childbirth at the Cempaka Putih District Health Centre and the Kemayoran District Health Centre, her research revealed that pregnant gymnastics has an effect on anxiety levels facing the process of childbirth. This is in line with the research of Citra Ayu Lestari entitled the effectiveness of pregnant exercises to reduce anxiety in pregnant women before the first childbirth, from the results of her research shows that pregnant exercises are very effective in reducing anxiety in pregnant women before the first childbirth.

Pregnancy exercises are very useful for reducing stress or anxiety during pregnancy (Yıldırım et al., 2022). However, pregnancy exercises are not a miracle cure that can free a person from all forms of stress, but pregnancy exercises can minimise the effect of stress on individuals.

Conclusion

Effectiveness of Pregnant Gymnastics as Prenatal Services in Lowering Anxiety Facing First Childbirth at the Healthy Insani Main Clinic PIK North Jakarta, at Puskesmas Kresek, Tangerang Banten Regency, Al-Barroh Main Clinic, Kayu Agung, South Sumatra and Az-Zahra Primary Clinic, South Jakarta with 25 respondents of pregnant women in the control group and 25 pregnant women with the intervention group, it can be concluded that pregnant gymnastics as a prenatal service is effective in reducing anxiety facing first childbirth, this can be seen from the results before and after the treatment and prenatal services of pregnant gymnastics. Education about pregnant gymnastics is also expected to be improved so that in the future there are no more pregnant women who are included in the category that has a high level of anxiety. It is expected for pregnant women to prepare for pregnancy as well as possible because if there is high anxiety during childbirth, it will risk the delivery process and the health of the mother and prospective baby. Providing education and counselling on pregnancy exercises can prevent high anxiety in the face of childbirth, if indeed the anxiety felt by the mother is high then she can do pregnancy exercises before delivery.

Author Contributions

In this short study, researchers state that all contributors play an active role in the portion of cooperation that has been agreed together, so that the contribution is very valuable and provides an extraordinary completeness of the study.

Conflicts of Interest

There is no conflict of interest in this study. All team members were dedicated to the research objectives and conducted with a high degree of independence.

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