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# THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND STRESS LEVEL WITH HYPEREMESIS GRAVIDARUM DEGREE AT TUGUREJO REGIONAL GENERAL HOSPITAL AND ROEMANI HOSPITAL SEMARANG

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**Abstract:** Hyperemesis Gravidarum (HEG) is a pregnancy illness of long-term nausea and vomiting with weight loss, dehydration, and malnutrition that is potentially life-threatening to mother and baby. In 2013, the Ministry of Health of the Republic of Indonesia stated that 14.8% of 5,212,568 pregnant women experienced HEG. HEG is influenced by various factors, including physical activity and stress levels. The intensity of physical activity during pregnancy directly impacts maternal health. Conversely, stress disrupts the hormonal balance in the body. Therefore, this study analyzed the relationship between physical activity, stress levels, and the severity of HEG at Tugurejo Hospital and Roemani Hospital in Semarang. This type of research is an analytic observation with a cross-sectional approach. The study population was HEG patients at Tugurejo Hospital and Roemani Hospital who met the inclusion criteria totaling 45 people with total sampling, tested with Spearman Rank. The correlation test results showed that physical activity with HEG degree had a weak correlation coefficient (r) of 0.311 positive correlation direction with ρ-value 0.037 (ρ<0.05), and stress level with HEG degree had a weak correlation coefficient (r) of 0.398 positive correlation direction with ρ-value 0.007 (ρ<0.05). A significant relationship exists between physical activity and stress level and the degree of HEG in Tugurejo Hospital and Roemani Hospital Semarang. In conclusion, the higher the physical activity performed and the higher the level of stress experienced, the more severe the degree of HEG.

**Keywords**: stress level, physical activity, HEG degree

## Introduction

According to the International Federation of Obstetrics and Gynecology, pregnancy is the union or fertilization of the ovum and spermatozoa followed by nidation or the entry of conception into the endometrium. According to the international fixed calendar, pregnancy naturally lasts for 9 months or 40 weeks and is divided into three trimesters. During pregnancy, there are changes in hormonal influences and production, anatomical and physiological changes. A common problem in early pregnancy is nausea and vomiting. Pregnant women who feel vomiting or nausea are about 50-75%. About 50% experience both vomiting and nausea, and the other 25% complain only of nausea.

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Symptoms can generally be worse in the morning or are often known as morning sickness. However, it can happen at night or during the day (Rorrong et al., 2021).

During pregnancy, vomiting or nausea is caused by a decrease in the muscle tone of the digestive tract and the effect of human chorionic gonadotropin (hCG), resulting in decreased mobility of all digestive tracts. An increase in hCG will cause the ovaries to produce estrogen, thus stimulating vomiting or nausea. HEG (Hyperemesis Gravidarum) is a condition characterized by weight loss, excessive nausea and vomiting, electrolyte imbalance, the mother appears thin, eyes look sunken, and skin turgor is reduced. Persistent nausea that occurs during the last 20 weeks or nausea and vomiting that exceeds 10 times a day in pregnancy continues to cause the mother's body to weaken, significantly decrease the frequency of urination and pale face (Rofi'ah et al., 2019).

HEG by the Hyperemesis Education and Research Foundation is defined as a potentially life-threatening and debilitating pregnancy illness recognized through malnutrition, rapid weight loss, and frequent nausea and vomiting leading to dehydration that can harm the newborn and mother (Rorrong et al., 2021). Based on data from WHO (World Health Organization) in 2013, HEG or excessive nausea and vomiting experienced by pregnant women in primigravida is around 60-80%, compared to around 40-60% in multigravida (Malahayati et al., 2015). According to the Ministry of Health of the Republic of Indonesia in 2013, there were 5,212,568 pregnant women, of which 14.8% experienced HEG (Rorrong et al., 2021).

The causative factors of HEG are not well understood but are thought to be caused by several factors including hormonal factors, allergies and nutrition, genetics, parity, Helicobacter pylori bacteria, age, psychology, and activity (Rorrong et al., 2021). Physical activity is classified into light, moderate, and heavy physical activities. The combination of these activity classifications is called total physical activity. Recent studies have shown that pregnant women can reduce symptoms of morning sickness with regular physical activity. Physical activity is related to daily work (Ministry of Health Republic of Indonesia, 2018; Pantiawati, 2010; Schuster, Kokić and Sindik, 2016).

The work factor in pregnant women is a factor that can cause pregnant women to be more stressed because of the dual role between work and family. The duration of the work of pregnant women also affects stress. The longer a pregnant woman works, the higher the risk pattern for health problems such as occupational stress. In this case, stress can be related to the status of physical activity or work in daily life, this status can affect the level of stress on the individual's body related to workload. However, stress during pregnancy can appear both indirectly and directly, which can lead to pregnancy complications (Kordi, 2017).

Although stress is a psychological form that has an important role in this situation, stress factors can involve integrative regulatory mechanisms that affect cellular and biochemical processes in the whole body, including the psychological and brain. Cortisol will increase when stressed. This can increase progesterone, a hormone that can provide a sense of calm and serves as a natural antidepressant. Increased progesterone levels may cause excessive vomiting or nausea. (Susanti et al., 2021).

Based on this explanation, the purpose of this study was to determine the relationship between physical activity and stress level with the degree of hyperemesis gravidarum at Tugurejo Regional General Hospital and Roemani Hospital in Semarang.

## Materials and Methods

This study is a quantitative study with a cross-sectional design applying observational analytic methods. The independent variables were physical activity and stress level and the dependent variable was the degree of HEG. The implementation of this research in Roemani Semarang Hospital and Tugurejo Hospital with the population taken is mothers who suffer from HEG period March 3, 2023-April 28, 2023.

The sample selection technique was held using the total sampling technique. The inclusion criteria in the study were pregnant women with the age of pregnancy in the first or second trimester who were or had been diagnosed with HEG and were treated or examined at Tugerejo Hospital or Roemani Hospital during the study period and were willing to become research subjects. The exclusion criteria were mothers who were diagnosed with multiple pregnancies and mola hidatidosa. The independent variables of this study were physical activity and stress levels. The degree of HEG was related to the dependent variable in this study.

The data collection method was carried out through direct interviews based on questionnaires prepared for data collection. Data collection begins with an explanation to the respondent about the purpose of the study and the confidentiality of the data collected. The questionnaire was applied to assess the level of physical activity using the International Physical Activity Questionnaire (IPAQ) and stress levels using DASS-42 (Depression Anxiety and Stress Scale-42). There are two stages in data analysis, namely univariate analysis and bivariate analysis using the Spearman Rank test, if a $\rho$ - value $<0.05$ is considered meaningful.

## Results and Discussion

*Table 1: Frequency distribution of respondent characteristics*

| Respondent characteristics | Frequency (f) | Percentage (%) |
|---|---|---|
| Age (years) | | |
| Under 20 | 1 | 2,2 |
| 20-35 | 42 | 93,3 |
| 36 or older | 2 | 4,4 |
| Job | | |
| Non-Workers | 20 | 44,4 |
| Workers | 25 | 55,6 |
| Gravida | | |
| 1 | 16 | 35,6 |
| 2 | 20 | 44,4 |
| 3 | 7 | 15,6 |
| 4 | 2 | 4,4 |
| Partus | | |
| 0 | 20 | 44,4 |

| | | |
|---|---|---|
| 1 | 17 | 37,8 |
| 2 | 7 | 15,6 |
| 3 | 1 | 2,2 |
| Abortus | | |
| 0 | 39 | 86,7 |
| 1 | 6 | 13,3 |
| Physical Activity | | |
| Inactive | 16 | 35,6 |
| Minimally Active | 26 | 57,8 |
| HEPA Active | 3 | 6,7 |
| Stress Level | | |
| Normal | 31 | 68,9 |
| Light | 5 | 11,1 |
| Medium | 7 | 15,6 |
| Heavy | 2 | 4,4 |
| Very Heavy | 0 | 0,0 |
| HEG degree | | |
| Level 1 | 7 | 15,6 |
| Level 2 | 35 | 77,8 |
| Level 3 | 3 | 6,7 |

Based on the results in Table 1, it can be proven that many respondents are 20-35 years old with a frequency of 42 samples or 93.3%. Regarding the work of research respondents, most respondents worked with a frequency of 25 samples or 55%. Most of the respondents' pregnancy status was the second pregnancy with a frequency of 20 samples or 44.4%. In addition, most respondents had never given birth to a child with a frequency of 20 samples or 44.4%, and most had never had a miscarriage with a frequency of 39 samples or 83.33%. Most of the respondents' physical activity was in the minimally active category with a frequency of 26 samples or 57.8%. Most respondents had normal stress levels with a frequency of 31 samples or 68.9%. Most respondents suffered from HEG grade 2 with a frequency of 35 samples or 77.8%.

*Table 2: Physical Activity and Degree of HEG*

| Variable | HEG Level 1 | | HEG Level 2 | | HEG Level 3 | | p-value | r |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | | |
| Physical Activity | | | | | | | | |
| Inactive | 5 | 71,4 | 10 | 28,6 | 1 | 33,3 | | |
| Minimally Active | 2 | 28,6 | 23 | 65,7 | 1 | 33,3 | 0,037 | 0,311 |
| HEPA Active | 0 | 0,0 | 2 | 5,7 | 1 | 33,3 | | |

The results of the Spearman Rank test obtained a ρ-value of 0.037 r score of 0.311. The ρ-value is below 0.05 (ρ<0.05) so the test decision is that there is a relationship between physical activity and the degree of HEG. The Rank Spearman correlation coefficient value of this study is 0.311. The direction of the relationship between the two variables is unidirectional because the direction of the relationship is positive. So, it can be interpreted that the higher the physical activity of the respondents, the higher the degree of HEG of the patient. The strength of the correlation is weak because it is in the range of 0.200-0.399.

*Table 3: Stress Levels and Degrees of HEG*

| Variable | HEG Level 1 | | HEG Level 2 | | HEG Level 3 | | p-value | r |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | | |
| Stress Level | | | | | | | | |
| Normal | 6 | 85,7 | 25 | 71,4 | 0 | 0,0 | | |
| Light | 1 | 14,3 | 4 | 11,4 | 0 | 0,0 | | |
| Medium | 0 | 0,0 | 6 | 17,1 | 1 | 33,3 | 0,007 | 0,398 |
| Heavy | 0 | 0,0 | 0 | 0,0 | 2 | 66,7 | | |
| Very Heavy | 0 | 0,0 | 0 | 0,0 | 0 | 0,0 | | |

The results of the Spearman Rank test obtained a ρ-value of 0.007 with an r value of 0.398. The ρ-value is less than 0.05 (ρ<0.05) so the test decision is that there is a relationship between the level of stress and the degree of HEG. The Rank Spearman correlation coefficient value of this study is 0.398. The direction of correlation between the two variables is unidirectional because the value is positive. So it can be interpreted that the higher the stress in the respondent, the higher the patient's HEG degree. The strength of the correlation relationship is classified as weak because it is in the range of 0.200-0.399.

The results showed that there was a correlation between physical activity and the degree of HEG. This is in line with the research of Ayuni, et al (2023), the results of statistical tests obtained a ρ-value of 0.024 (ρ-value <0.05) so that the conclusion is that there is a significant correlation between physical activity and HEG (Ayuni et al., 2023).

Previous research has shown that women with a normal Body Mass Index (BMI) who are not physically active have a higher chance of experiencing HEG in their first pregnancy. The study showed that women who experienced severe vomiting or nausea in early pregnancy were less likely to

engage in leisure-time physical activity before pregnancy. In a similar study, it was found that pregnant women who engaged in regular leisure-time physical activity also reduced the severity of pregnancy-induced nausea and vomiting and had a lower risk of HEG. The study found that pregnant women who experienced mild nausea and vomiting tended to do more physical activity and stand at work than pregnant women with severe nausea and vomiting (Connolly et al., 2019; Owe et al., 2019).

This is supported by the theory that physical activity is a movement performed by the body and is considered important during pregnancy because it has many benefits for the mother and fetus. Physical activity during pregnancy has a variety of benefits including increasing heart blood flow, strengthening muscles, maintaining bones and joints, and relaxing and calming the body. However, it is different for mothers who experience severe nausea and vomiting. The mother's weak condition makes it unwilling and difficult for her to carry out normal activities and daily work. Mothers are advised to rest more so that the condition of nausea and vomiting does not get worse, and mothers can recover and do their daily activities normally (Kusumawati et al., 2019).

In this study has a Rank Spearman correlation coefficient value of 0.311 and this correlation number is positive and the direction of the relationship is unidirectional. Based on the researcher's assumption, this can arise due to work factors, when viewed from the research data as many as 25 pregnant women (55.6%) are workers so they have a heavy workload because, in addition to having to take care of homework, they also have to complete their duties at work. With a high workload, the mother's daily activities become uncontrolled and can cause stress in pregnant women. Excessive stress can trigger the release of the hormone cortisol which can affect the function of the digestive system and cause nausea and vomiting. Based on this, the value of the Rank Spearman correlation coefficient can be positive.

The results of the study prove that stress levels correlate with the degree of HEG. These results are also supported by research by Hayanah, et al (2021) obtained a ρ-value of 0.000 (ρ <0.05) and an r number of 0.610 which proves the direction of the positive correlation, with the interpretation of a strong relationship, the higher the degree of maternal stress will increase the level of maternal nausea and vomiting (Haniyah et al., 2021).

This is because stress is a psychological condition. Stress triggers the hypothalamus, then sets off a chain of biochemical events that cause non-adrenaline and adrenaline to flow into the system, followed by the hormone cortisol. If you allow stress to continue, psychologically the body remains in an active state with an excess of cortisol hormone. The increase in cortisol hormone during stress has a positive relationship with the increase in progesterone. Excessive nausea and vomiting are caused by increased progesterone hormone (Khayati et al., 2018; Herrera, Nielsen, and Mather, 2016). This is to the research of Susanti, et al (2021) which proves that the ρ-value is 0.000 (ρ <0.05), so the conclusion is that there is a significant correlation between stress and HEG (Susanti et al., 2021).

This is also reinforced by the results of research from Simbolon (2022) obtained a ρ-value of 0.000 and an r score of 0.603 which shows that there is a significant relationship between stress and the occurrence of HEG syndrome. In this study, it was emphasized that stress is a contributing factor to HEG. Although its relationship with HEG is not yet understood. A fractured household situation, fear of maternal responsibilities, fear of labor and pregnancy, and loss of employment, can cause mental

problems that may exacerbate vomiting and nausea as an escape from life's difficulties or as a subconscious expression of compulsion to become pregnant (Simbolon, 2022).

Similar research was also conducted by Idham and Mourisa (2022) who stated that there was a relationship between stress and HEG in pregnant women in Medan city (ρ-value 0.028). This study showed that some samples experienced HEG level II, whereas most of the samples experienced moderate stress (Idham, 2022). This can be caused because individuals who are in a stressful condition will encourage sympathetic nerve activity whose impact is the stimulation of hormones in the adrenal medulla. These sympathetic nerves have the effect of decreasing gastric motility, thus slowing down the work of the digestive system. This condition encourages individuals to feel vomiting or nausea easily (Hall, 2011).

In this study, the Rank Spearman correlation coefficient value was 0.398 and this correlation number was positive and the direction of the relationship was unidirectional. Based on the researcher's explanation, this can occur due to psychological factors, especially stress, when viewed from the research data of patients experiencing HEG level 3, two patients (66.7%) experienced severe stress, and one (33.3%) experienced moderate stress. This indicates that pregnant women who have problems controlling various kinds of stressors have high levels of stress, which can cause more severe symptoms of nausea and vomiting compared to pregnant women who can control stress factors well. Based on this, the value of the Rank Spearman correlation coefficient can be positive.

## Conclusion

As the data obtained and the analysis carried out in this study related to the relationship between physical activity and stress levels with HEG levels at Tugurejo Hospital and Roemani Hospital can be concluded that: there is a correlation between physical activity and HEG levels at Tugurejo Hospital and Roemani Hospital. The results of the analysis obtained are with a ρ-value <0.037 and an r score of 0.311, which means that the higher the physical activity carried out, the patient's HEG level increases with a weak correlation value. There is a relationship between the level of stress and the degree of HEG in Tugurejo Hospital and Roemani Hospital Semarang. The results of the analysis obtained are with a score of ρ-value <0.007 and an r score of 0.398, which means that the higher the level of stress experienced, the higher the patient's HEG degree with a weak correlation value.

Apart from the conclusions obtained, this study has several limitations including the research sample is relatively small, namely 45 samples, so the generalization is still limited and cannot describe all HEG patients in Semarang City. This study did not discuss other factors that could influence the level of stress and physical activity of pregnant women, such as family support, medical history, and social and economic conditions of pregnant women. This study used a questionnaire to collect data, so there is a possibility of bias or lack of information submitted by respondents. This study used Google Forms on patients who could not be interviewed directly so that the patient's understanding and honesty in filling out the questionnaire could not be confirmed. Finally, this study did not separately describe the characteristics of the samples obtained at each hospital.

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**Declaration of Interest Statement**

The authors declare that they have no conflict of interests.

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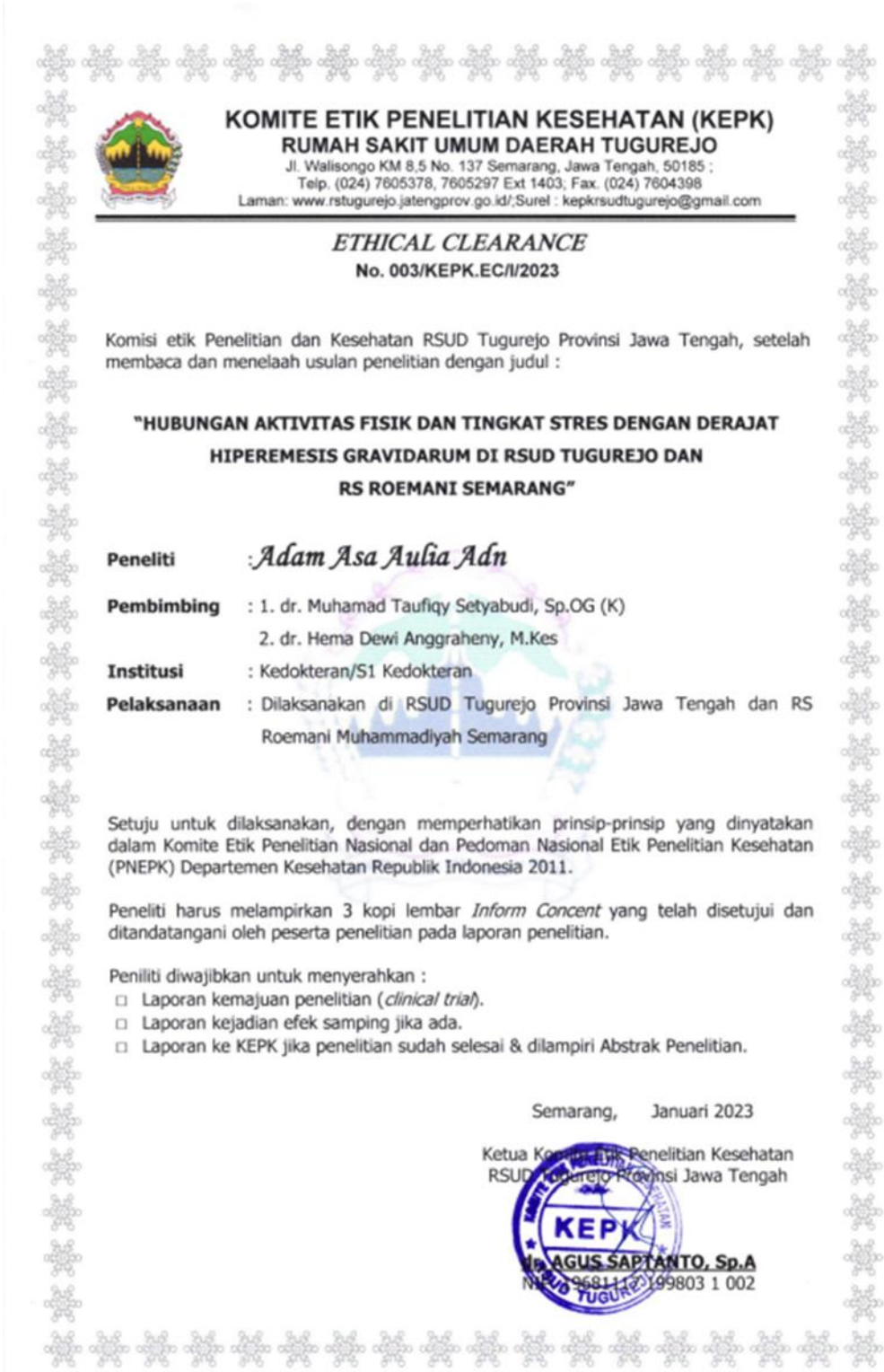
## Appendix

1. Ethical Clearance



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*ETHICAL CLEARANCE*
**No. 003/KEPK.EC/I/2023**

Komisi etik Penelitian dan Kesehatan RSUD Tugurejo Provinsi Jawa Tengah, setelah membaca dan menelaah usulan penelitian dengan judul :

**"HUBUNGAN AKTIVITAS FISIK DAN TINGKAT STRES DENGAN DERAJAT HIPEREMESIS GRAVIDARUM DI RSUD TUGUREJO DAN RS ROEMANI SEMARANG"**

**Peneliti** : *Adam Asa Aulia Adn*
**Pembimbing** : 1. dr. Muhamad Taufiqy Setyabudi, Sp.OG (K)
2. dr. Hema Dewi Anggraheny, M.Kes
**Institusi** : Kedokteran/S1 Kedokteran
**Pelaksanaan** : Dilaksanakan di RSUD Tugurejo Provinsi Jawa Tengah dan RS Roemani Muhammadiyah Semarang

Setuju untuk dilaksanakan, dengan memperhatikan prinsip-prinsip yang dinyatakan dalam Komite Etik Penelitian Nasional dan Pedoman Nasional Etik Penelitian Kesehatan (PNEPK) Departemen Kesehatan Republik Indonesia 2011.

Peneliti harus melampirkan 3 kopi lembar *Inform Concent* yang telah disetujui dan ditandatangani oleh peserta penelitian pada laporan penelitian.

Peniliti diwajibkan untuk menyerahkan :
- ☐ Laporan kemajuan penelitian (*clinical trial*).
- ☐ Laporan kejadian efek samping jika ada.
- ☐ Laporan ke KEPK jika penelitian sudah selesai & dilampiri Abstrak Penelitian.

Semarang, Januari 2023

Ketua Komite Etik Penelitian Kesehatan
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