



REVIEW ARTICLE

## Water Aerobic Exercise Improves Mother's Quality of Life During Pregnancy: A Systematic Review

Novadri Ayubi<sup>1ADE</sup>, Dhea Regita Sastika Putri<sup>2ABD</sup>, Atika Syafawi<sup>2ABD</sup>, Mohammed Aljunaid<sup>3ABD</sup>, Jiang Wen Ming<sup>4ABD</sup>, Heru Syarli Lesmana<sup>5ABD</sup> and Procopio B. Dafun Jr.<sup>6ABD</sup>

<sup>1</sup>Universitas Negeri Surabaya

<sup>2</sup>Universitas Airlangga

<sup>3</sup>Taiz University

<sup>4</sup>Universiti Pendidikan Sultan Idris

<sup>5</sup>Universität Innsbruck

<sup>6</sup>Mariano Marcos State University

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Corresponding Author: Novadri Ayubi, E-mail: novadriayubi@unesa.ac.id

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### Abstract

**Objectives.** This study aimed to analyze the effectiveness, benefits and safety of water aerobic exercise in improving the quality of life of pregnant women from a psychological and physical perspective.

**Materials and methods.** The present study is defined as a type of systematic review research using searches from journal databases such as MEDLINE-PubMed, Web of Science, Scopus and Science Direct. The inclusion criteria for this study were articles published in the last 5 years and articles discussing pregnancy, aquatic aerobic exercise and quality of life in pregnancy. A total of 53 articles from the Science Direct, PubMed, and Web of Science databases were identified. A total of 8 articles that met the inclusion criteria were selected and analyzed for this systematic review. For standard operations, this study followed the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) assessment.

**Results.** The findings of this systematic review indicate that participating in aquatic aerobic exercises has been found to reduce pain during labour, reduce the use of epidural analgesics during labour, reduce depression during pregnancy, reduce the risk of fetal distress, stabilize blood pressure, reduce back pain, and improve the psychological condition of pregnant women.

**Conclusions.** The regular practice of water aerobic exercise carried out from the 2nd trimester of pregnancy contributes to having a positive impact on improving the quality of life of pregnant women.

**Keywords:** water aerobic exercise, aquatic exercise, quality of life, pregnancy.

### Introduction

The quality of life of pregnant women is the main axis for a mother during pregnancy and childbirth, this is a measuring tool used to comprehensively assess the health status of pregnant women starting from physical, psychological to social health (Boutib et al., 2022). Hormonal, anatomical, biological and physiological changes in the mother's body

during pregnancy make them more susceptible to disease, thus affecting the quality of life of pregnant women and the well-being of the fetus (Kazma et al., 2020).

Discomfort during pregnancy experienced by the mother causes a decrease in the quality of life because it is closely related to the mental and psychological readiness of the mother, this can have a negative impact on the health of the mother and fetus, resulting in death (Wu et al., 2021; Roddy Mitchell et al., 2023). Around 287,000 women died during pregnancy and childbirth in 2020, one of the main causes being depression. Worse yet, nearly 95% of all maternal deaths occurred in low- and middle-income countries in

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2020, and most of them are preventable (Roddy Mitchell et al., 2023; Corcoran et al., 2022). In Indonesia, up to 25% of pregnant women experience depression during pregnancy and this increases the maternal mortality rate. Studies show that changes in body image, anatomical changes, and complaints experienced by mothers during pregnancy are the main causes of depression, which can actually be prevented by easy, practical and effective methods, namely regular exercise (Bhattacharjee et al., 2021).

Exercise is one solution that can improve the mother's psychological and physical well-being during pregnancy (Xu et al., 2023). Aerobic water exercise has been proven to be more effective in increasing levels of dopamine, serotonin and noradrenaline which can reduce several complications during pregnancy both psychologically and physically, thereby improving the mother's quality of life during pregnancy (Alizadeh Pahlavani, 2024).

The American College of Obstetricians and Gynecologists recommends that pregnant women need a social environment that encourages them to do things that have a positive impact on their pregnancy (ACOG, 2020). Regularly undertaking a physical exercise program has been proven to be very beneficial and safe during pregnancy (Cancela-Carral et al., 2022). Aerobic water exercise has also been proven to have a therapeutic effect that can prevent various health problems for pregnant women such as back pain, strengthen the mother's muscles and joints, improve blood circulation so that the fetus's nutritional and oxygen needs are met, and provide a relaxing effect so that it can reduce stress levels. mother during pregnancy (Boutib et al., 2023).

The lack of research related to this topic is one of the reasons this sport is not widely known among the general public. This study aims to analyze the effectiveness, benefits and safety of aerobic water exercise in improving the quality of life of pregnant women from a psychological and physical perspective.

## Materials and Methods

### Study Design

This type of systematic review research uses searches from journal databases such as MEDLINE-Pubmed, Web of Science, Scopus and Science Direct. It is considered a premier platform worldwide as it brings together publications that have scientific impact and relevance.

### Eligibility Criteria

The inclusion criteria in this study were articles published in the last 5 years and articles discussing pregnancy, aquatic water exercise and quality of life in pregnancy. Furthermore, the exclusion criteria in this research are journals that are not reputable or are not indexed by Scopus and Web of Science.

### Procedure

Titles, abstracts and full texts of articles were screened then verified and stored in Mendeley software. In the first stage, 53 articles from the Science direct, Pubmed and web of science databases were identified. Next, in the second stage, 27 articles were screened based on the suitability of the title

and abstract. In the third stage, 19 articles were ordered for further processing. At this stage we filter based on the overall suitability of the article. Then in the final stage 8 articles were selected that met the inclusion criteria and analyzed for this systematic observation. For operational standards, this study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) assessment.

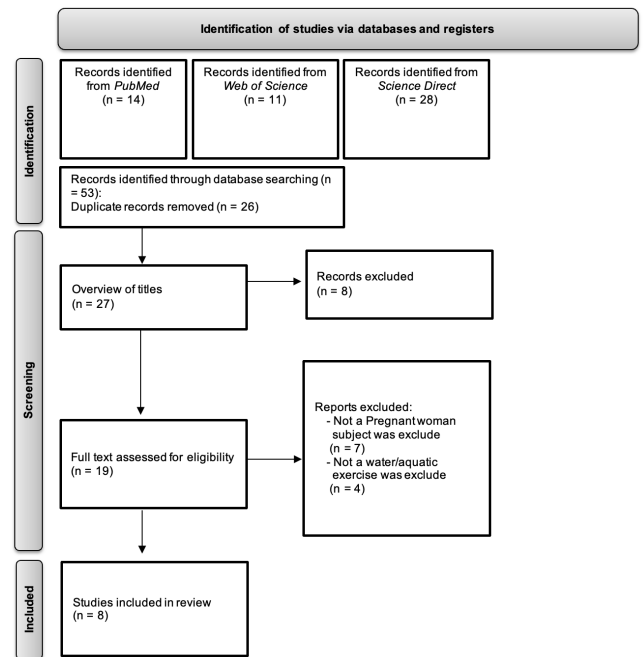


Fig. 1. PRISMA flowchart of the article selection process

## Results

### Description of Aerobic Water Exercises Include in Review

Based on the articles selected and analyzed as a whole, it was found that the intervention was carried out in accordance with the recommendations of the American College of Sports Medicine, where ideally physical exercise should be carried out regularly 3-5 sessions/week, 55-65% of the maximum heart rate which is the intensity of the mother's exercise. Pregnancy will be lighter than those who are not pregnant, the ideal duration is 20-60 min, and pay attention to a heart rate of no more than 140 bpm and a temperature below 38°C (Physical Activity Guidelines Resources, 2024).

From 8 selected articles (Navas et al., 2020; Navas et al., 2021a; Rodríguez-Blancue et al., 2020; Rodríguez-Blancue, Sanchez-García, et al., 2019; Rodríguez-Blancue, Sánchez-García, et al., 2019a; Vázquez-Lara et al., 2019; Granath, et al., 2022; Vallim et al., 2021), all implemented Aerobic water exercise in the intervention group which consisted of 3-4 phases, namely:

1. Warm up outside the water (5-7 min);
2. Warming up in water (5-10 min);
3. Aerobic Water Exercise moderate intensity (20 min);
4. Stretching and Relaxation (5 min).

The movements in aerobic water exercise are guided by a trained midwife or nurse who has attended the Study of

**Table 1.** Summary of the design and intervention of the studies

Author	Design	Participants	Gestational Age	Intervention	Outcome
(Navas et al., 2020)	Randomised Control Trial	IG = 160 CG = 160	Pregnant women aged 18-40 years with a gestational age of 14-20 weeks	IG = Pregnant women will take aerobic water exercise classes 3x/week for 5 months. Aerobic water exercise in this study consisted of: 1. Warm up outside the water (5-7 min) 2. Warming up in water (5-10 min) 3. Medium intensity water exercise (20 min) 4. Relax and regulate your breathing (5 min) 5. Playful exercise (5 min) CG = Pregnant women will receive standard antenatal care by a midwife or other health practitioner.	1. Aerobic Water Exercise can reduce pain during labor. Measuring Tool: Visual Analogue Scale (VAS). 2. Aerobic water exercise can reduce the use of epidural analgesia during labor. Measuring tools: reviewed by members of the research team themselves. 3. Aerobic water exercise can reduce levels of depression during the antenatal to postnatal period Measuring tools: Edinburgh Postnatal 4. Depression Scale (EPDS), EuroQol five dimension (EQ-5D)
(Navas et al., 2021)	Randomised Control Trial	IG = 145 CG = 141	Pregnant women aged 18-40 years with a gestational age of 14-20 weeks	IG = Pregnant women will take aerobic water exercise classes 3x/week for 5 months. Aquatic exercise in this research consists of: 1. Warm up outside the water, including neck stretching; pectoral muscles; shoulder; back; thighs and ankle and knee mobility training (5-7 min) 2. Warm up in the water, including a leisurely walk; small jump; walk back and forth in the water (5-10 min) 3. Moderate intensity water exercise (20 min) 4. Relax and regulate your breathing (5 min) 5. Playful exercise (5 min) CG = Pregnant women will receive standard antenatal care and are still advised to do physical activity.	1. Aquatic Exercise can significantly reduce pain during labor compared to standard care. Measuring Tool: Visual Analogue Scale (VAS). IG= mean $\pm$ SD 7.55 $\pm$ 2.20 CG= mean $\pm$ SD 8.15 $\pm$ 1.95 2. Intrapartum fetal distress in IG is less than in CG IG = 25/120 (n=20.8%) CG = 28/119 (n=23.5%)
(Rodríguez-Blanque et al., 2020)	Randomised clinical trial	IG = 65 CG = 64	Pregnant woman with 12 weeks of gestation	IG = Given moderate intensity physical activity in water for 60 min, 3x/week, supervised by a midwife or nurse with a sports science degree who has undertaken SWEP training. Physical exercise in water in this study was divided into 3 phases per session, including: 1. Warm-up 2. Main phase (Aerobic Water Exercise) 3. Stretch and relaxi CG = The control group was given standard care recommended during pregnancy by a midwife or ob-gyn doctor who was provided during the research.	The results of the health assessment from the HRQoL summary showed that the IG experienced a decrease of 3.93 at the end of the study, while the CG experienced a greater decrease of 8.07 points. Even in the mental health component, the CG score drops to $\leq$ 42, which is a point indicating a threshold risk of depression.

**Table 1** (continued)

Author	Design	Participants	Gestational Age	Intervention	Outcome
(Rodríguez-Blanche, Sanchez-Garcia, et al., 2019)	Randomised Clinical Trial	IG = 65 CG = 64	Third trimester pregnant women without any contraindications to doing water exercise	IG = Given moderate intensity physical activity in water for 60 min, 3x/week, supervised by a midwife or nurse with a sports science degree who has undertaken SWEP training. Physical exercise in water in this study was divided into 3 phases per session, including: 1. Warm-up 2. Main phase (Aerobic Water Exercise) 3. Stretching and relaxation CG = Control group given standard care.	Water exercise during pregnancy which is carried out routinely 3x/week for 60 min at 20-37 weeks of pregnancy has been proven to be able to minimize the rate of perineal tearing during delivery.
(Rodríguez-Blanche, Sánchez-García, et al., 2019a)	Randomised Control Trial	IG = 60 CG = 60	Pregnant woman with 12 weeks of gestation	IG = Intervention is carried out when pregnant women are 20-37 weeks gestation by being given moderate intensity physical activity in water according to the SWEP (Study of Water Exercise during Prgnancy) method guided by trained midwife professionals. CG = Control group was given standard care recommended during pregnancy by a midwife or ob-gyn doctor who was provided during the study.	Water exercise performed during pregnancy has shown a positive impact on shorter duration of labor compared to those receiving standard care. This can improve the mother's quality of life and reduce the risk of postnatal depression.
(Vázquez-Lara et al., 2019)	Randomised Clinical Trial	IG = 18 CG = 28	Second trimester pregnant women who are physically and psychologically healthy	IG = Aquatic exercise program for pregnant women (AEPWP) is given for 6 weeks starting from 24-28 weeks of pregnancy to 32-36 weeks, carried out 2x/week for 45 min/session. To provide hyperbaric stimulation, the intervention is carried out in a pool at neck level. CG = Provided standard antenatal care, monitored directly by the research team and midwife	The aquatic exercise program given to IG has a positive impact, namely stabilizing the blood pressure of pregnant women after regular exercise compared to pregnant women in CG whose blood pressure is higher.
(Granath, et al., 2022)	Randomised Control Trial	IG = 132 CG = 134	Healthy pregnant women in second trimester and third trimester	IG = Water aerobics is given for the first 45 min and followed by 15 min of relaxation, guided by a trained midwife instructor. CG = Given Land-Based Physical Exercise (LBPE), specifically designed for pregnant women and guided by trained Midwives.	Water exercise carried out regularly during pregnancy can significantly reduce back pain in mothers compared to LBPE. Pregnant women with LBP after intervention: IG = 19 CG = 34
(Vallim et al., 2021)	Randomised Clinical Trial	IG = 31 CG = 35	Pregnant women with a gestational age of 28-36 weeks	IG = Pregnant women will take part in aerobic water exercise classes specifically for pregnant women 3-5x/week for 50 min/session in accordance with the recommendations of the American College of Sports Medicine. CG = Receive antenatal care according to standards	Most participants showed better psychological conditions in the intervention group. Measuring tool: WHOQOL-BREF questionnaire

\*IG: Intervention Group; CG: Control Group; SD: Standard Deviation

Water Exercise during Pregnancy (SWEP) training course (Rodríguez-Blanke, Sánchez-García, et al., 2019).

Participants who took part in the study were healthy pregnant women without any complications from their current or previous pregnancies. If during the study one of the following events occurs: Dizziness, chest pain, shortness of breath, swollen legs, reduced fetal movement, contractions, bleeding, and premature rupture of membranes, then the physical exercise will be stopped and the participant will be taken to hospital for treatment. according to complaint (Navas et al., 2020; Navas et al., 2021a; Rodríguez-Blanke et al., 2020; Rodríguez-Blanke, Sanchez-Garcia, et al., 2019; Rodríguez-Blanke, Sánchez-García, et al., 2019a; Vázquez-Lara et al., 2019; Granath, et al., 2022; Vallim et al., 2021).

#### *Ideal gestational age when doing water exercise*

The division of groups in the articles we analyzed all divided the research participants into two groups, namely the intervention group and the control group, both of whom were given antenatal care during pregnancy by a midwife or obstetrician-gynecologist in accordance with standards and provided aerobic water exercise in the intervention group (Navas et al., 2020; Navas et al., 2021a; Rodríguez-Blanke et al., 2020; Rodríguez-Blanke, Sanchez-Garcia, et al., 2019; Rodríguez-Blanke, Sánchez-García, et al., 2019a; Vázquez-Lara et al., 2019; Vallim et al., 2021). There is one article that provides a physical exercise intervention on land to a control group that compares it with an intervention group that was given physical exercise in the water (Granath, et al., 2022).

The research participants involved in this study were pregnant women in the second trimester of pregnancy, which physiologically at this gestational age has changed the structure of the spine so that pregnant women often complain of back pain, the burden of the fetus carried by the mother will increase, and Other complaints felt by pregnant women will increase at this gestational age, so that it will affect the decline in the mother's quality of life during pregnancy (Lagadec et al., 2018). Therefore, providing physical exercise in water here is 2x more effective in improving bone posture because movements carried out in water can strengthen bones and muscles, so that back pain in pregnant women can be reduced (Wu et al., 2021; Peng et al., 2022). If done regularly, water exercise will also relax the pelvic muscles, which can reduce tearing of the birth canal during labor (Cancela-Carral et al., 2022; Wu et al., 2021). In theory, water exercise can increase a person's hormones dopamine, serotonin and noradrenaline so that if applied to pregnant women it will have a positive impact on the mother's quality of life during pregnancy (Kepley et al., 2023). Apart from that, water exercise also has a therapeutic effect compared to exercise done on land, which can also reduce maternal depression in dealing with complaints during pregnancy (Cancela-Carral et al., 2022; Wu et al., 2021).

#### *Quality of Life Post-intervention*

The mother's quality of life during pregnancy is often influenced by several factors, such as a lack of support system from those closest to her, complaints felt during pregnancy, changes in body image, fear of facing childbirth, and others (Kepley et al., 2023). In this systematic review,

various outcomes were found after participants were given the intervention. Aerobic water exercise, which was carried out regularly by research participants, had a positive impact on them compared to the control group who were only given standard antenatal care (Navas et al., 2020; Navas et al., 2021a; Rodríguez-Blanke et al., 2020; Rodríguez-Blanke, Sanchez-Garcia, et al., 2019; Rodríguez-Blanke, Sánchez-García, et al., 2019a; Vázquez-Lara et al., 2019; Vallim et al., 2021). There was less pain during childbirth in the group of participants who did aerobic water exercise regularly. This was monitored by the research team itself starting from the participant recruitment process, namely pregnant women aged 12 weeks, then carried out health screening and given intervention when the mother entered the second trimester and assessed pain during labor using VAS (Navas et al., 2020; Navas et al., 2021a).

The quality of life of pregnant women is closely related to the incidence of depression during pregnancy until postpartum. In the above study, measuring the possibility of depressive symptoms using the Edinburgh Postnatal Depression Scale (EPDS) questionnaire, which has adequate sensitivity and specificity for identifying depressive symptoms during pregnancy. The results obtained were that after the water exercise intervention was given, depressive symptoms decreased in the intervention group compared to the control group (Navas et al., 2020).

Research that compares the differences in effect between water exercise and land base physical exercise (LBPE) also shows that after being given regular intervention, the water exercise group can reduce back pain more than the LBPE group (Granath, et al., 2022).

## **Discussion**

This systematic review aims to analyze the benefits of aerobic water exercise in improving the mother's quality of life during pregnancy. From a search in the journal database, 8 relevant articles were found. The limited amount of recent research that addresses this issue shows that Aerobic water exercise has a positive impact in improving the quality of life of mothers and has not received much attention, even though improving the quality of life of mothers during pregnancy is the main axis in the realization of global problems, namely maternal and fetal mortality rates (Pascual & Langaker, 2023).

Aerobic water exercise is carried out according to the recommendations of the American College of Sports Medicine, namely carried out regularly 3-5 sessions/week, 55-65% of maximum heart rate, where the intensity of exercise in pregnant women will be lighter than in non-pregnant conditions, duration ideally 20-60 min, and pay attention to a heart rate of no more than 140 bpm and a temperature below 38°C (Stine et al., 2023). For pregnant women, doing physical exercise in water can provide many benefits, such as improving body image, reducing back pain, and managing the mother's emotions during pregnancy (Kepley et al., 2023; Gangakhedkar, 2022).

Measuring the quality of life of pregnant women can be assessed using a standard instrument, namely the EQ-5D, which has a very good level of validity and reliability for assessing the health condition of each individual (Feng et al., 2021). The EQ-5D questionnaire has a preference basis

with specific questions for each dimension, consisting of mobility, discomfort, pain, and maternal anxiety/depression during pregnancy (Navas et al., 2020; Navas et al., 2021a; Feng et al., 2021). Pain measurement is also included in the questionnaire which is measured using the Visual Analog Scale (VAS), which is used to measure maternal labor pain (Navas et al., 2020; Navas et al., 2021; Zhang et al., 2023). Assessment of maternal quality of life using this questionnaire was also applied to the articles analyzed, which showed the results that aerobic water exercise was able to reduce maternal depression symptoms during the antenatal to postnatal period and was able to reduce pain during childbirth so that the mother's quality of life increased (Navas et al., 2020; Navas et al., 2021a). Other studies use different measuring instruments to assess the level of maternal depression such as the Edinburgh Postnatal Depression Scale (EPDS) questionnaire, Health-Related Quality of Life (HRQoL) questionnaire (Navas et al., 2020; Navas et al., 2021a; Rodríguez-Blanque et al., 2020). This is in accordance with previous research which states that physical exercise can significantly reduce depression in mothers compared to mothers who do not do physical exercise during pregnancy (Sánchez-Polán et al., 2021; Silva-Jose et al., 2023).

Preeclampsia is one of the most common causes of maternal death throughout the world. This can be prevented through early screening during the first trimester of pregnancy by monitoring the increase in blood pressure in pregnant women (Shandilya, Sinha & Rani, 2023). Stabilizing blood pressure can also be done by doing regular aerobic water exercise, which has been proven in the analyzed article that the Aquatic exercise program for pregnant women (AEPWP) is given for 6 weeks starting from 24-28 weeks of pregnancy to 32-36 weeks, done 2x/week for 45 min/session. To provide hyperbaric stimulation, the intervention was carried out in a pool with a depth of neck level, which significantly stabilized maternal blood pressure during pregnancy compared to the group that was not given the intervention (Vázquez-Lara et al., 2019).

From this systematic review, relevant articles have proven that aerobic water exercise can reduce pain during labor, reduce the use of epidural analgesics during labor, reduce maternal depression during pregnancy, reduce the risk of fetal distress, stabilize maternal blood pressure, reduce maternal back pain, and improve the condition of the mother. maternal psychology.

### Strenght and Limitations

This systematic review has the advantage that it lies in the research design that analyzed only randomized control trials, considered the most reliable scientific evidence because it eliminates false causality. Providing aerobic water exercise which has a stable intensity and duration so that the results obtained are very relevant and recommended. The limitation that we encountered is that there is still limited recent research that addresses this issue, showing that Aerobic water exercise has a positive impact in improving the quality of life of mothers, it has not received much attention, even though improving the quality of life of mothers during pregnancy is the main axis in realizing global problems, namely reducing mortality rates mother and fetus.

### Conclusions

Based on the relevant articles that we found, we can conclude that Aerobic Water Exercise which is carried out regularly starting from the 2<sup>nd</sup> trimester of pregnancy will have a positive impact in improving the quality of life of pregnant women.

### Conflicts of Interest

The authors declare no conflict of interest.

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## Виконання вправ з аквааеробіки покращує якість життя матері під час вагітності: Систематичний огляд

Новадрі Аюбі<sup>1ADE</sup>, Деа Регіта Састіка Путрі<sup>2ABD</sup>,  
Атіка Шафаві<sup>2ABD</sup>, Мохаммед Алджунаїд<sup>3ABD</sup>, Цзян Вен Мін<sup>4ABD</sup>,  
Херу Шарлі Лесмана<sup>5ABD</sup>, Прокопіо Б. Дафун молодший<sup>6ABD</sup>

<sup>1</sup>Сурабайський державний університет

<sup>2</sup>Університет Айрланга

<sup>3</sup>Університет Таїзу

<sup>4</sup>Університет освіти імені Султана Ідріса

<sup>5</sup>Інсбрукський університет

<sup>6</sup>Державний університет імені Маріано Маркоса

Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 8 с., 1 табл., 1 рис., 31 джерело.

**Мета дослідження.** Метою цього дослідження було проаналізувати ефективність, переваги та безпеку виконання вправ з аквааеробіки для покращення якості життя вагітних жінок з психологічної та фізичної точок зору.

**Матеріали та методи.** Представлене дослідження визначається як вид систематичного огляду з використанням пошукових запитів у наукометричних базах даних журналів, як-от MEDLINE-PubMed, Web of Science, Scopus і Science Direct. Критеріями включення до цього дослідження були статті, опубліковані за останні 5 років, в яких обговорювалися питання вагітності, виконання вправ з аквааеробіки та якості життя під час вагітності. Загалом було виявлено 53 статті з наукометричних баз даних Science Direct, PubMed та Web of Science. Для систематичного огляду було відібрано та проаналізовано 8 статей, які відповідали критеріям включення. Що стосується стандартних операцій, дане дослідження проводилося відповідно до рекомендацій “Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)” (Переважні елементи звітності для систематичних оглядів і мета-аналізів).

**Результати.** Отримані результати систематичного огляду вказують на те, що залучення до занять аквааеробікою сприяє зниженню більшого синдрому під час пологів, зменшенню застосування епідуральних анальгетиків під час пологів, зниженню рівня депресії під час вагітності, зниженню ризику дистресу плода, стабілізації артеріального тиску, зменшенню болю в спині та покращенню психологічного стану вагітних жінок.

**Висновки.** Регулярна практика виконання вправ з аквааеробіки, починаючи з 2-го триместру вагітності, сприяє позитивному впливу на покращення якості життя вагітних жінок.

**Ключові слова:** вправи з аквааеробіки, вправи у воді, якість життя, вагітність.

### Information about the authors:

**Ayubi, Novadri:** novadriayubi@unesa.ac.id; <https://orcid.org/0000-0002-5196-6636>; Sport and Exercise Research Center, Universitas Negeri Surabaya, Jl. Lidah Wetan, Lidah Wetan, Kec. Lakarsantri, Kota SBY, Jawa Timur 60213, Indonesia.

**Putri, Dhea Regita Sastika:** sastikaputri@gmail.com; <https://orcid.org/0000-0001-8646-9851>; Universitas Airlangga, Jl. Mayjen Prof. Dr. Moestopo No.47, Pacar Kembang, Kec. Tambaksari, Kota SBY, Jawa Timur 60132, Indonesia.

**Syafawi, Atika:** atikasyafawi@gmail.com; <https://orcid.org/0000-0003-0338-4890>; Universitas Airlangga, Jl. Mayjen Prof. Dr. Moestopo No.47, Pacar Kembang, Kec. Tambaksari, Kota SBY, Jawa Timur 60132, Indonesia.

**Aljunaid, Mohammed:** mohammed.aljunaid90@gmail.com; <https://orcid.org/0000-0001-6311-2534>; Taiz University, P.O. Box 6803, Taiz, Yemen.

**Ming, Jiang Wen:** wenmingjiang975@gmail.com; <https://orcid.org/0009-0001-3759-9753>; Universiti Pendidikan Sultan Idris, Tanjung Malim, Perak, 35900, Malaysia.

**Lesmana, Heru Syarli:** Heru.Lesmana@student.uibk.ac.id; <https://orcid.org/0000-0003-0036-9716>; Universität Innsbruck, Innrain 52, 6020 Innsbruck, Austria.

**Dafun Jr., Procopio B.:** pbdafun@mmsu.edu.ph; <https://orcid.org/0000-0002-4249-6126>; Mariano Marcos State University, 16 Quiling Sur, City of Batac, 2906 Ilocos Norte, Philippines.

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