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EFFECT OF YOGA ON MANAGEMENT OF POLYCYSTIC OVARIAN SYNDROME (PCOS): A SYSTEMATIC REVIEW

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ABSTRACT

Background:

Nowadays, the polycystic ovarian syndrome is a widespread condition that affects women at their reproductive age. Women are considered to have significantly elevated amounts of insulin resistance, obesity, and higher levels of androgens within the part of the body with PCOS. The crucial thing about overcoming these signs and symptoms of illness is weight management. It has a primary preventive and healing ability that can be accomplished by implementing lifestyle changes to fight this disease.

Yogic interventions are the primary key that continues a person's health and modifies the endocrine system. Postures (*Asanas*), Breathing techniques (*Pranayama*) and meditation (*dhyana*) facilitate plenty in relieving the signs and symptoms of PCOS associated with an incorrect dwelling lifestyle and deep-rooted stress and holding the person high to combat with this sickness.

Purpose:

This Review study is aimed to review the trends in research conducted over a period of time frame. Only randomized Control Trials and Clinical Trials are subjected of interest in this study. Using PUBMED, Google Scholar and other Indian databases searches were performed using keywords "Yoga and PCOS" which yielded up to 31 relevant articles showing the effect of Yoga on PCOS.

Selections were made to include only studies published in peer reviewed journals and investigating effects of regular Yogic practices on hormonal imbalances, weight loss, stress

reduction and various other related aspects pertaining to PCOS in these studies.

Summary and Outlook:

Noteworthy variance was observed between the interventional group participants on the domain of hormones, weight loss, Anxiety, Stress and physical function with better results in Yoga groups than in control group. Collectively these studies suggest that specific Yogic module may help to balance hormone, reduce body weight and released stress and it may improve the physical function of the body.

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18 *Keywords: Yoga, Stress, PCOS and Hormones*

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1. INTRODUCTION

20

21
22 A very common condition, Polycystic Ovarian Disease (PCOD), also known as Polycystic
23 Ovary Syndrome (PCOS), affects 5% to 10% of women in the 12-45 age group.¹

24 Polycystic ovary syndrome (PCOS) is a complex condition characterized by elevated
25 androgen levels, menstrual irregularities, and/or small cysts on one or both ovaries. The
26 disorder can be morphological (polycystic ovaries) or predominantly biochemical
27 (hyperandrogenemia). Hyperandrogenism, a clinical hallmark of PCOS, can cause inhibition
28 of follicular development, microcysts in the ovaries, anovulation, and menstrual changes.²

29 Yoga is a full body and mind prescription that can eradicate the root cause of PCOS, i.e.,
30 Stress and obesity. In addition, Yoga is a fantastic tension buster stress in women's lives
31 that can also lead to an unnecessary rise in weight. Entering a peaceful state decreases the
32 production of cortisol, a stress hormone that is one of the most significant causes of fat
33 accumulation in the body. Yoga ultimately advocates a move beyond the comfort zone to
34 optimistically better understand one's self from a very different viewpoint. Ultimately, it
35 contributes to improved quality of life.³

36 Because of genetics, obesity, drugs, aging, pregnancy and lifestyle, these variables build
37 insulin resistance. Altered metabolism of steroid hormones and lipid metabolism can develop
38 PCOS. Signs and symptoms of PCOS can involve menstrual disruption (primary
39 amenorrhea, secondary amenorrhea, oligomenorrhea). Infertility (due to lack of ovulation.),
40 high level of masculinizing hormones (acne, hirsutism, hypermenorrhea) metabolic
41 syndrome (obesity, resistance to insulin) and several other symptoms such as: oily skin,
42 dandruff.

43 PCOS-Adolescent Diagnostic Appearance - Menstrual Irregularity, Cosmetic problems, i.e.,
44 Reproductive acne, hirsutism and hair loss- Infertility, Early Pregnancy Loss, Menopausal
45 Syndrome, and Ca Endometrium during pregnancy (PIH and GDM).⁴ A close association
46 between obesity, stress and PCOS exists. About 50-60 percent of PCOS women are obese.
47 With prevalence rates ranging from 2.2 percent to as high as 26 percent, PCOS is the most
48 common female endocrine disorder. Both genetic predisposition and life style variables are
49 thought to contribute to PCOS etiology. Altered life pattern involving a high calorie diet and

50 lack of exercise contributing to obesity and insulin resistance, which has been well
51 established as an exacerbating factor for PCOS.⁵ Studies have shown that sympathetic
52 function is chronically activated as a consequence of stressful life.

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55 **1.1 YOGA**

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57 Yoga comes from the root, symbolizing the unification with the cosmic consciousness of
58 one's own consciousness. Regular Yoga practice has been shown at a functional level to
59 promote strength, stamina, and flexibility and produce qualities of generosity, compassion,
60 and better self-control and tranquility. Yoga practice induces a physiological state of rest and
61 relaxation that activates the parasympathetic nervous system (instead of the flight-or-fight
62 stress response) and can achieve a sense of equilibrium and union between the mind and
63 body.⁶

64 An eightfold path to enlightenment is illustrated by *Patanjali Yoga Sutras*, from socio-
65 emotional wellbeing to physical and mental health, ending with spiritual liberation. Through
66 the use of the *Asanas* and *Pranayama*, *Hatha* Yoga strengthens the ability of the physical
67 body. Hatha Yoga's breathing methods prolong inhalation, holding of breath, and exhalation.
68 It is through the convergence of the *Sharira*, *Prana*, and *Mana* that blocks in the *Prana*
69 channels are cleared when performing *Asanas*. The system then reaches equilibrium. This is
70 particularly useful for a lifestyle condition that hinders the body's normal functioning.
71 According to Yoga ideology, stress or psychosomatic disorders are the cause of any illness
72 in the human body. The most prominent mental symptoms of PCOS are depression and
73 anxiety, according to the literature, while mood and anxiety disturbances are the most
74 prevalent clinical diagnosis of PCOS⁶.

75 Although the system of Yoga is not developed for the purpose of treatment, it has been
76 observed through the applied researches shows evidence that the regular practice of Yoga
77 not only controls this disease but also promotes and maintain the healthy condition of the
78 body and mind and prevents the disease progression. Yoga has a potential to tranquilize
79 and balance the mind, which is the main key in the management of stress disorders.⁶

80 **1.2 SIGNIFICANCE OF YOGA ON PCOS (RATIONALE):**

81

82 Yoga science is based on the root cause, i.e., stress and obesity, of PCOS. Yoga is often
83 more holistic than just the physical body level. Yoga helps profoundly accumulated stress to
84 be released by the system, which can further strengthen PCOS symptoms.

85 1. Doing weight-bearing poses strengthens muscles. In fact, enhanced muscle mass leads
86 to the fight against insulin resistance, one of the links to PCOS regulation.

87 2. Yoga's daily practice increases the heart rate, provides cardiovascular activity and leads
88 to the loss of weight.

89 3. Hormonal balance and deep relaxation are facilitated by asanas and pranayama, helping
90 to increase adrenal and cortisol levels.

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93 **2. MATERIAL AND METHODS**

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95 Search articles for this systematic review were identified by using PUBMED, Google Scholar
96 and general Google search which yielded total 31 research papers which met our inclusion
97 criteria. Out of which 5 were found to be duplicate articles, 5 articles include different pathies
98 with Yoga as an intervention, one study was a clinical roundup study, 9 were review articles,
99 one article with other language are excluded from our study. Only Randomized Control Trials
100 and Clinical Trials are subjected to this review study. Which were published in English, had
101 clear diagnostic criteria for PCOS Patients. Out of 12 articles available on Google Scholar, 8
102 articles were available on PUBMED which are short-listed. (Fig 1)

103 After scrutinizing 31 articles, 09 trials were selected as they met criteria for final review.

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105 **2.1 INCLUSION CRITERIA:**

- 106 1. Studies included Randomized control trial and Clinical trial.
- 107 2. Published in English, between the years from 2001-2020.
- 108 3. Age group 12–55 years suffering from PCOS.
- 109 4. Investigating only effect of Yoga on obesity, hormones, glucose metabolism, stress
110 and physical activity.

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112 **2.2 EXCLUSION CRITERIA:**

113 Studies were excluded if -

- 114 1. Studies which include other interventions like naturopathy, Ayurveda and siddha.
- 115 2. Age ranges above 55 and suffering from other menstrual disorders
- 116 3. Literary review articles.
- 117 4. Paper published before 2001.
- 118 5. Duplicate articles are excluded.

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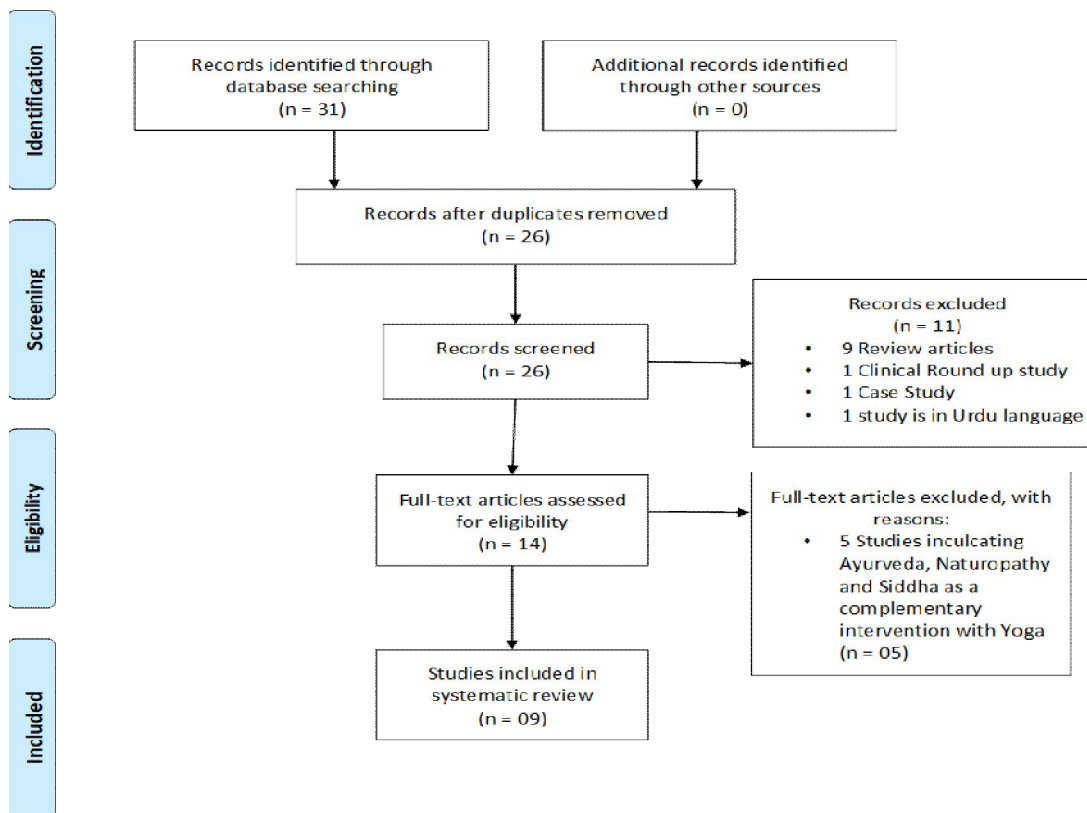
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FIGURE 1 : SCHEMATIC REPRESENTATION OF STUDY SEARCHING AND SELECTION AS PER CRITERIA.

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161 3. RESULTS AND DISCUSSION

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163 3.1 RESULT:

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165 Search yielded a total of 31 trials, of which 09 met criteria for final review which shows a
166 significant difference between Yoga group and control group in terms of hormones, weight
167 balance, stressed level and physical activity. Yoga was found to be more effective than
168 conventional physical exercises in improving glucose, lipid, and insulin values, including
169 insulin resistance values.

170 Yoga can play important role in the prevention & management of PCOS. Yoga can maintain
171 the Physiology of H-P-O axis.¹⁷ Yoga is one of the important refreshing and rejuvenating
172 modalities which can content and even root out stress completely. Since stress is playing
173 important factor in exaggerating PCOS, Yoga help to regulate the endocrine glands in body
174 there by beneficial in balancing of hormones Yoga is effective in keeping your ovary &
175 Uterus healthy. Yoga is precious gift which can enrich human life. In PCOS, Yoga plays a

176 crucial role in regulating hormones by reducing androgens and promoting the development
177 of eggs. Yoga relieves stress it promotes weight loss and also increases fertility and with the
178 help of Yoga gastrointestinal imbalance is also improve. Asana help to stretch the pelvic
179 area and pranayama and meditation sooth the mind.

180 Asanas (Yoga postures) for polycystic ovary syndrome help to loosen up the pelvic region
181 and facilitate relaxation, and pranayamas (breathing exercises) are important strategies that
182 help to calm the mind. Coupled with few calming meditations that act at a very deep level
183 and enable the whole system to De-toxify and de-stress.

184 Researches have shown very significant changes in Yogic intervention group. Yoga: -

- 185 • Reduced distress feelings
- 186 • Increased sensitivity to insulin
- 187 • Equilibrated amounts of androgen
- 188 • Enhanced Hirsutism
- 189 • Led to significant regularity of menstruation

190 **3.2 DISCUSSION:**

191 **Literature Review:**

192
193 The Randomized control Study conducted by Chattha R et al. Hot flushes and night
194 sweats could enhance by holistic approach to Yoga therapy. Cognitive functions such as
195 remote memory, mental control, attention and concentration, delayed and immediate
196 recall, verbal retention and tests for identification may also be improved.⁷ The
197 randomized controlled study by Laxmi et al. which objectifies to analyze and discuss
198 about the impact of Yoga on women's suffering from PCOS. And the result of this study
199 shows that Symptoms such as weight gain, cysts or fibroids in the uterus, irregular
200 menstrual cycle, unwanted facial hair, and emotions are reduced after 3 months of Yoga
201 practice. The overall quality of life improvement is reflected in the form of symptoms
202 such as weight reduction, reduction in unusual hair loss, elevated menstrual bleeding,
203 cramps, fat, constipation, and the reduction of emotional disturbances.⁸ hence this study
204 has shown the very significant impact of Yoga on females. Study by Ram Nidhi et al.
205 shows that: A 12-week holistic Yoga program is considerably better than physical activity
206 in minimizing AMH, LH, and testosterone, mFG hirsutism ranking, and non-significant
207 menstrual frequency enhancement. In adolescent PCOS, improvements in bodyweight,
208 FSH, and prolactin.⁶

209
210 In the 2 groups of study by Ram Nidhi et al. on the effect of glucose metabolism and
211 body lipid level in adolescent's girls with PCOS, the changes in fasting insulin, fasting
212 blood glucose, and homeostasis model evaluation of insulin resistance were
213 substantially different. Yoga in adolescent girls with PCOS individual with anthropometric

214 improvements was found to be more effective than conventional physical exercises in
215 improving glucose, lipid, and insulin values, including insulin resistance values.⁹

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217 According to study conducted by Nidhi r. et al., A holistic Yoga program for adolescents
218 with PCOS for 12 weeks is significantly better than a physical exercise program for
219 reducing symptoms of anxiety.¹⁰

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221 Women that had completed the mindful thrice-week intervention of Yoga in randomized
222 controlled study of Patel V et al. had resulted slightly lower levels of free testosterone.
223 Improved testosterone, lower trend in dehydroepiandrosterone levels. In addition,
224 improvements in depression and anxiety interventions were observed.¹¹

225

226 After the intervention of study conducted by Selvaraj V et al., psychological factors such
227 as the menstrual cycle, blood flow during periods of cramps, pimples, hair fall, fatigue
228 and weight gain have improved. Most girls showed more energy and were relieved from
229 depression. It is also essential that exercise and Yoga, since it includes both body and
230 mind, can undoubtedly enhance the psychological aspects of any person.¹¹ Sode JA et.
231 al. Yoga therapy among women suffering from infertility may be potentially useful in
232 improving anxiety scores.¹² Vanitha A et al. After Yoga training, the degree of stress and
233 depression is low relative to the pre-test state (Before Yoga training).¹³

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235 **Mechanism of Yoga:**

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237 Diverse therapeutic modalities have been developed to treat polycystic ovarian
238 syndrome as a result of various pathophysiologic processes. 1 Although
239 pharmacological therapies for this condition have been proposed, there are no
240 indications of the safety and security of these medications, particularly when used over
241 an extended period of time. Additionally, none of these medications have been given the
242 go-ahead for use in treating polycystic ovarian syndrome by the American Food and
243 Drug Administration¹⁴.

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245 One of the most significant and secure forms of therapy that has always been regarded
246 as the starting point for treatment is lifestyle modification, it may be mentioned. A mix of
247 behavioral (lowering psychosocial stresses), dietary, and exercise therapy make up
248 lifestyle modification.¹⁴ Dietary adjustments and physical activity are examples of
249 lifestyle alterations that lower the prevalence of obesity and hormonal issues in these
250 people.¹⁵ Exercise and weight loss together can lower insulin levels and testosterone
251 levels, which can help patients' symptoms¹⁶. It is widely known that 5–14% weight loss
252 with dietary restriction and exercise can enhance hormonal features and reproductive
253 function in obese and overweight women with polycystic ovary syndrome¹⁶.

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255 It is widely known that 5–14% weight loss with dietary restriction and exercise can
256 enhance hormonal features and reproductive function in obese and overweight women
257 with polycystic ovary syndrome.¹⁷ Yoga poses that focus on the body's flexibility and
258 muscular power can also aid to enhance blood circulation and the supply of oxygen to
259 the reproductive organs. In addition, yoga enhances the autonomic nervous system,

260 lowers blood pressure and lipids, controls respiration, and regulates emotions. By
 261 controlling the endocrine system, lowering stress levels, and harmonizing neuronal
 262 hormones, yoga enhances reproductive function. By boosting cortisol excretion, yoga
 263 also lowers blood cortisol levels, which can relieve PCOS symptoms.¹⁶
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265 Today, yoga is used as a treatment for various conditions such as hypertension, multiple
 266 sclerosis, asthma, low back pain, and arthritis, as well as pain and stress management.
 267 The results of various studies have shown that doing yoga exercises in women with
 268 polycystic ovary syndrome has led to improved insulin sensitivity and lipid indexes¹⁸.
 269 Furthermore, in the latest systematic review studies conducted in 2020, it was stated
 270 that although regular exercises have helped improve hormonal, metabolic, and clinical
 271 parameters among these patients, there is the need for better and more accurate
 272 studies in this regard¹⁸.
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276 4. CONCLUSION

277
 278 The most common health issue in women of reproductive age is polycystic ovarian
 279 syndrome. Women diagnosed with PCOS have profound resistance to insulin, obesity and
 280 elevated androgen levels. The main key to keeping people safe is the Yoga therapies listed
 281 in several trials. After studying these papers, we may conclude the following practices that
 282 may help in PCOS and may improve their other comorbidity like stress, hypertension etc.:
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 284

285 **TABLE : 1 RECOMMENDED YOGA PRACTICES:**

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Shatkarma	❖ <i>Vaman Dhauti, Kapalbhati</i>
Asana	1. Standing– <i>Tiryaktadasana, katichakrasana</i> 2. Sitting- <i>Padmasana, Bhadrasana, Ustrasana</i> <i>,Malasana</i> 3. Prone - <i>Bhujangasana , Dhanurasana</i> <i>,Makarasana</i> 4. Supine – <i>Setubandhasana, Ardhalasana ,Shavasana</i>
Pranayama	❖ <i>Anulom Vilom ,Bhramari , and Ujjayi</i>
Mudra	❖ <i>Vipreetkarani Mudra</i>
Dhyana /Yog Nidra	❖ <i>Om Meditation</i>

287
 288 **Supportive basis of certain practices taken in above protocol:**
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290 **Shatkriya (cleansing practices)** helps to detoxify the impure toxins from the body and is
 291 very effective in the management of obese person. **Asanas (physical postures)** helps to
 292 balance the whole endocrine system by direct massaging the ovarian glands and improve
 293 the blood circulation there by regulates the menstruation cycle. **Pranayama (breathing**
 294 **regulation)** helps to balance both the brain hemispheres and induces relaxation of mind &

295 body.¹⁹ **Mudra (gestures)** helps to redirect the *prana* within the affected body organ and
296 improves flow of *prana* and blood there. **Yoga Nidra / Dhyana (Meditation)** Both Meditation
297 and Yoga Nidra assist in the activation of the calming reflex and the enhancement of
298 nervous system and endocrine system function, which affects hormones, as well as
299 decreasing anxiety and enhancing mood.

300

301 **5. STUDY LIMITATION**

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303 Studies have been carried out in different demographic areas, which prompt the issue of the
304 study's findings being generalizable. However, the fact a randomized control trial with a large
305 sample participating in each arm provides evidence for the intervention
306 being more effective. Our searches were limited to few databases only, wide range of
307 databases are needed in this context. Studies should consider a longer period of follow to
308 check long term efficacy & long-term acceptability to observe the Changes in the number of
309 ovaries and follicle size. A lot of studies are not PubMed indexed. They are to be searched
310 from various sources. This consumes a lot of time.

311

312 **6. FINANCIAL SUPPORT AND SPONSORSHIP**

313

314 This research did not receive any specific grant from funding agencies in the public,
315 commercial, or not-for-profit sectors.

316

317 **7. CONFLICTS OF INTEREST**

318

319 There are no conflicts of interest.

320

321 **8. AUTHORS' CONTRIBUTIONS**

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323 1. Divya Singh: Conception or design of the work, Data collection, Data analysis and
324 interpretation and drafting the article.

325 2. Kautuk Kishore Chaturvedi: Review of final manuscript

326 3. Shalini Singh: Review of final manuscript.

327 4. Dr. S. Lakshmi Kandan: Conceptualization, Expert opinion, critical revision of
328 manuscript

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330 The authors read and approved the final manuscript.

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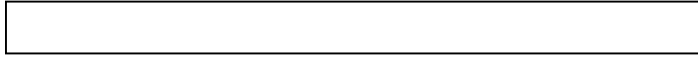
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