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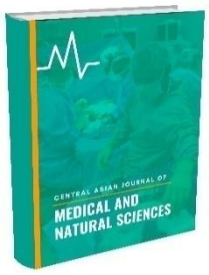

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Serum Chromium Levels and its Relation with PCOS: A Review Search

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Abstract:

Objective: PCOS: Polycystic ovarian syndrome is a general form between procreation age women which be able to effect in increases death rate also ailments in women owing to increasing the diabetes plus fats risk also the diseases of cardiovascular. This study planed to review the efficiency of usually PCOS curing on the diabetes predicted in PCOS women without diabetic.

Materials & methods: A broad investigate was achieved on the scientific journals from 1986 till 2023. A whole of 62 articles involving examination, also analysis are including in this review article.

Results: In PCOS women, this review discovered the change of daily life may be case limited effects included heaviness and obese decreasing might not obtained via medicinal innovations. Chromium supplement can illustrate in expansion in PCOS women.

Conclusion: Grouping of daily life adjustment through chromium supplement may improve the effect of the PCOS avoidance, as well as discover a special response to management in non- fat comparing with fat PCOS women.

Key words: PCOS; Chromium supplementation; Diabetes.

1. Introduction

The food complementation effects on polycystic ovary syndrome, PCOS avoidance had been considering. PCOS is a form described via hyperandrogenism, menstrual irregularity as well as polycystic ovaries Figure 1. Many studies were illustrating the chromium supplement effect in care for patients with PCOS. A 6%-8% of women are affected in the procreation age [1, 2]. Their frequencies with teenagers differ among populations and along with principle designed for classification. A prevalence rates reported of 8%, 18%, and 26% as of diverse populations [3-5]. PCOS threat is increasing with fat patients. Fatness chiefly by abdominal heavy distribution was seen in 50% of PCOS women. Because fatness begins in early time, fat youth are a high PCOS risk [6]. Insulin

resistance was concerned in the PCOS pathogenesis mainly with obese women [7] also; PCOS was related with glucose intolerance incidence increasing [8] as well as metabolic syndrome [5, 9].

The review aimed to evaluate the efficiency of the mainly universal therapies of nutritional supplements with chromium on the prevention of diabetes and its related insulin resistance marker also disorders treatment in patients with PCOS.

An increase in the Luteinizing Hormone, LH release ratio to Follicle-Stimulating Hormone, FSH as of the front pituitary affect the ovarian cells also conduces to an enhanced in the androgens producing as of theca cells and reduces in estrogen creation. Increases androgens levels in the negative feed- back form increases the Gonadotropin Releasing hormone, GnRH release from the hypothalamus by raise the amount of LH release to FSH. In adding, increasing androgens creation leads to increases hyperinsulinemia also insulin resistance, which worsen the GnRH liberate. Hyperinsulinemia also indirectly acts to increases the androgens plus LH.

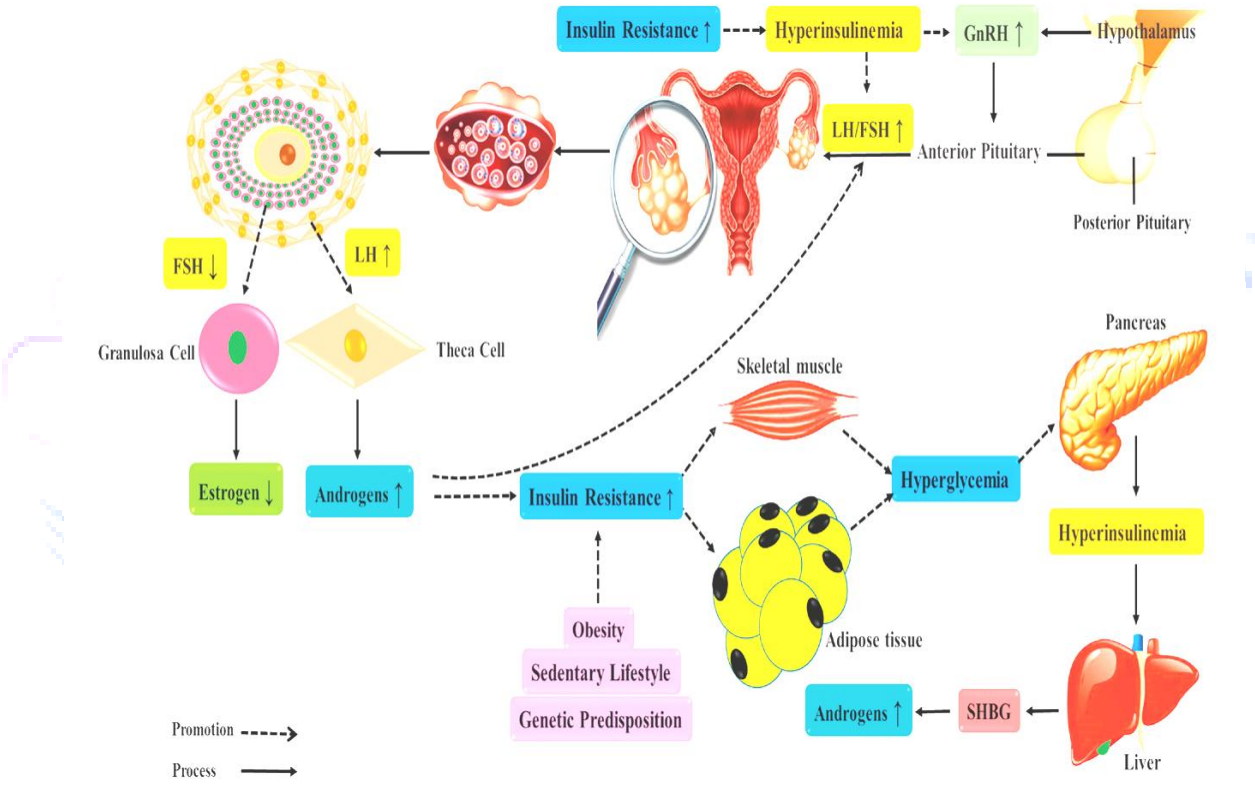

Figure 1: The PCOS pathophysiologic characteristics.

2. Materials and methods

A literature review that contains researches published from 1986 till 2023 that contains data includes PCOS, insulin resistance, IR, supplements with Cr, disorder treatments also modification of lifestyle. Special article are assesses via its quality, a totality of 62 articles are includes in this review which apparent difference in the studied results. Articles that are illustrated according to the title also abstract, studies get better population through diverse subject are including just if they achieved associate tests to comparison the therapy response among modalities of treatments.

3. Results:

A PCOS conference was holed at the 1990 by National Institutes of Health; it was turn to be valued since the syndrome covered broader spectrum of symbols also symptom of ovarian dysfunction that

distinct via the initial diagnostic criterion. The 2003 Rotterdam agreement seminar completed that PCOS is an ovarian dysfunction syndrome next to the basic characteristics hyperandrogenism also PCO-morphology. PCOS stays a syndrome also an only diagnostic reason was enough for medical diagnosis. Its medical signs might contain menstrual irregularity, symbols of androgen excess also fatness. Insulin resistance in PCOS also raised serum LH concentrations was also ordinary marks. PCOS is related through an increases of diabetes type 2 risk as well as cardiovascular actions [10].

Chromium can be found in multiple oxidation states; nevertheless only Cr^{III} has positive effects [11]. It had been consider as a necessary element for the best performance on the mammal organisms list. The results indicated that the Cr amount in the hair composition, plasma as well as the negative relationship with age, that is what distinguishes it from the other accumulative pollutants in the body of a living organism over time. In subjects with parenteral nutrition at long term, Cr deficiency symptoms are achieved mostly through glucose intolerance after Cr complementation these changes are simply treating [12, 13]. An indication for Cr supplementation uses was so large; nevertheless, a Cr element causes the most disagreements.

Chromium gets its best fame by the ending of the last century; the scientific researches illustrate number of lessons about the Cr supplementation influence on the body carbohydrate–lipid system. The suggestions concerning the influence on the markers relating insulin resistance allow presuming the efficacy of some complementation in PCOS. The indicate action mechanisms for Cr inveterate in analysis animal was unluckily not forever complete in the medical studies. The supplementation efficacy in diabetes also dyslipidaemias was weakened; in maintain suitable body weight-negative. The obtainable information on the Cr role are frequently opposing, also the knowledge state do not completely verify the prior assumption which sadly often was the poor planning result of study workings. An interested fact is specially the possibility of Cr influence the mood, which form a big challenge in the discus situation. An important thing for using supplementation of Cr in PCOS patients can be also the detail that in animal analysis, low limit of Cr was showed in serum also in muscles associated through hyperinsulinaemia [14].

The effects of nutritional supplements with Cr in PCOS have been studied. Owing to the PCOS concomitance with IR, an experiment was prepared and applying Cr supplementation in IR disorder. The results showed the value of the increases supply of Cr in keeping the suitable insulin also glucose limits in fasting circumstances, an development of the plasma element limit which are concerned owing to a illness [15], also it proved the reliance among the Cr and insulin concentrations with dehydroepiandrosterone, DHEA [16].

The estimation of concentrations of special elements counting Cr in plasma was studied and reviewed in clinical study evaluated chromium limits of plasma chosen by Spritzer et al. don't show different among patients women have PCOS plus controls [17]. Amr N. and Abdel-Rahim H.E. estimated the effects of supplementation in teenagers between 14-17 years [18]. In six months, a 35 teenagers' girls through menstruation disorder history are intended for this study which is given 1000 μg of chromium picolinate, any important IBM changing don't observed; though, the subjects numeral that suffered from oligomenorrhoea or amenorrhoea symptom decreases in the group with supplement, as well as, a considerable decreasing of the mean volume of ovary also the whole ovarian cysts number was achieved. The essential result, in the group with supplement, the serum free testosterone limit was much lesser, also the PCOS therapy via Cr are accomplished in adult women as well as the analysis results was obtainable in review documents [19-22]. The finishing analysis involved just 5 correctly random also placebo studies via 137 women have PCOS; three studying assess Cr as a lone supplement [23-25], whereas two of this studied evaluate Chromium compared with metformin [26, 27].

Maleki et al. explained that to obtain a clear effect of the amount of Cr taken requires a long period of supplementation time on the plasma sex hormones limits in plasma [21]. Several studies in USA, Egypt

also Iran via reproductive age women Chromium comparing with additional treatment causes important modified IR markers also showed a major difference causes as the supplementation effects on HOMA-B in PCOS women after supplementation for eight weeks, as well as a observed decreases in HOMA-IR plus an increasing comparing with placebo [24]. These studies via analysis didn't give a clear answer concerning the supplementation efficiency as well as the experiential effect are so weak and don't allow the implementation of some methods to the standard clinical treatment of PCOS patients.

Chromium is an important human life nutrient was uses at dosage upper than the smallest nutritional level to influence the blood sugar control in diabetics. Chromium was documented as 1 of 15 elements grave for proper physiological lipid and carbohydrate metabolism performance. Chromium deficiency can imitate several cardiovascular disease signs such as elevated serum cholesterol also triglycerides, also decreases high density lipoprotein cholesterol, HDL [28].

To examine the effect of chromium picolinate, CrP on insulin resistance, IR in PCOS, there were no clearly diverse between both groups of women relating to pretreatment FBS, FSI, FGIR levels also serum testosterone. Using CrP in favor of six months be related through important decreases of BMI ($P < 0.001$) also FSI ($P = 0.007$), as well as clearly increases in FGIR ($P = 0.045$). CrP observed increases the ovulation probability ($P = 0.011$) plus normal menstruation ($P = 0.002$) with about 2-fold past the Fifths treatment months, next, CrP was helpful in PCOS to eliminate IR also stimulated ovulation [29].

In disorders chromium treatment in PCOS patients, physical disorders therapy must be carry out in agreement through the present requirements aiming to reach the desired goals. The disorders of psychosocial diseases are frequently missing in therapy methods must be take good attention and give psychological assist to overcome the sadness that appears in those circumstances [30, 31].

Primary data represented the antidepressant opportunity effectiveness of Cr since 1990s which are explained the signs of unusual hopelessness, dysthymia, affective disorder also every day mood sway decreases. Some PCOS women have depression correlated to inactive efforts at pregnant, higher BMI also little self respect, planning by Cr be able to get helpful effect. The effectiveness of Cr as antidepressant activity organisms appears to be medicinal in nature [32–34], since deficiency in Cr is rare [35, 36], also the efficient dosage are quite high in experiments plus in medical appliance; so administered of Cr in amount between 400–600 μg/day was successful in depression patients [37-39].

Z. Kurdoglu et.al. Study the serum important trace elements concentrations, Zn, Mg, Cu, Mn and heavy metal Pb, Co plus Cd are estimated via atomic absorption spectrophotometry in the PCOS patient serum. A whole of 65 women, 30 athletic controls and 35 patients with PCOS are including at this work. Serum Cu plus Zn concentrations are much high other than Mn also Pb amounts were poorer in PCOS patients comparing with the healthy women ($p < 0.01$). There are no different among PCOS patients and the healthy controls according to the serum Mg, Co and Cd levels. This initial study estimated the Mn, Cu, Zn, Pb, Co, Mg also Cd amounts in the PCOS patient's serum. The trace elements Zn, Mg, Cu, Mn level also heavy metals Pb, Co and Cd serum may differ in PCOS patients [40]. The complicated mechanics in association via clinical conditions such as seasonal disturbances, abnormal depression also its effects on carbohydrate and lipid metabolisms make supplementation of Cr for PCOS patient still an important and interesting subject of study.

To estimate the levels of 11 heavy metals also trace elements in serum of PCOS patients, a whole of 369 women with 96 PCOS patients are examined. No different via statistical analysis in the mean Ba, Cd, Pb, As, Cr, Ga, Sr and V levels are showed among the PCOS with the healthy group. Serum Ni also Cu concentrations are clearly upper, however Zn concentrations are much lower in PCOS patients comparing by the healthy groups. The association data among metal intensity and hormone

concentrations specify that Cu, Ni and Zn has a function in the PCOS pathogenesis associated with reproductive hormone concentrations [41].

Treatment with chromium was suggested to recover insulin sensitivity in youth with PCOS which keeps complicated. To study the chromium supplement effects on the elements range of PCOS in teenager girls, 35 youth girls with PCOS are registered. All undergo physical exams for acne presence, score of hirsute also estimation body mass guide. All peoples get CrP at 1000 mg for six months following in re-examination. No apparent different in BMI standard deviation score, SDS by chromium supplement was illustrating [42].

Pathophysiology in comparative by the important mineral includes Cu, Mg, Zn, Mn, Cr and Ca was documented in women with insulin resistance. 132 women through PCOS also 46 healthy women are examined. Women through PCOS are more separated base on the insulin resistance presence. In every women, concentration of gonadotropins, prolactin, testosterone, insulin, glucose also Cu, Mg, Zn, Mn, Cr also Ca elements concentrations were calculated. Serum concentrations of testosterone, luteinizing hormone also fasting insulin are notably upper in the PCOS peoples contrast to healthy also PCOS women with no insulin resistance. A woman with PCOS shows obviously higher Ca also lesser Mn level as comparing to healthy controls. PCOS women with IR showed much lesser serum concentrations of Mg plus Cr adding to high concentrations of Zn also Cu. The different in Ca as well as Mn concentrations become exaggerated with insulin resistance when comparing to healthy control also PCOS women with no IR. In PCOS-associate insulin resistance, circulate serum Mg also Cr type majorly associated with fasting insulin concentrations. The results showed that extreme element grade might be a basis solution for insulin resistance in PCOS [43].

Mehri Jamilian & ollah Asemib study the beneficial chromium intake effects on insulin metabolism markers also lipid profiles in PCOS suffering women. The results illustrate the Cr-supplement in women with PCOS produced in important serum insulin levels decreasing, homeostasis model of assessment- insulin resistance, HOMA-IR, homeostatic model assessment-beta cell function, HOMA-B, also a considerable increasing in quantitative insulin sensitivity check index comparing with the placebo. In adding, a tendency to a large chromium complementation effect on decreases serum triglycerides, incredibly low-density lipoprotein-cholesterol also concentration of cholesterol was observed. The results show that the 8 weeks of chromium supplement with PCOS women have positive effects on insulin metabolism markers [44].

Chromium is important element for metabolism of carbohydrate also lipids. Results of different analysis as well as meta-analysis of chromium supplement also diabetes metabolic profiles may be unsuitable. A 25 arbitrary illegal examination convene the addition criterion, from these, a 22 study estimated chromium mono-supplement. One study examines chromium yeast plus vitamins C also E as well as two further assessed CrP as well as biotin, CPB. In particular, chromium mono-therapy actually reduces triglycerides plus increases HDL-C concentrations. Glycaemic control might advance with chromium mono-supplement of other than 200 μg each day. The adverse actions risk did not vary among chromium plus placebo. The accessible facts proposed positive chromium supplement effects on glycaemic control in diabetes patients. Chromium mono-supplementation might extra improving triglycerides also HDL-C concentrations. Chromium supplement at normal dosage does not increase the adverse events risk comparing with placebo. Facts on chromium combine supplement are incomplete and uncertain. Long-term advantage also protect of chromium complementation stay to be additional examine [45].

Davis W. Lamson & Steven M. Plaza reviewed the results on the values for chromium supplement and different chromium complex safety and dosage. The 350 fold different among the suitable each day intake plus the computed reference dosage for persons of 70 mg/day seem to be with no precedent with revere to further nutritional elements. The favorable chromium effects are able to improve by Cr

supplement in types 1 also 2 diabetes which the effect show dosage dependent. There is confirmation of hormonal effect of chromium complement as well the effect on insulin. Chromium supplement make result in tissue maintenance, chiefly in the kidney, while no pathogenic effects have been established even with significant study [46].

The chromium supplement is assumed to increasing with increases glucose bigotry also diabetes. Persons being treat for diabetes type 2, 180 men plus women are randomly divided to three sets which supplement by: 1- placebo, 2- with 1.92 µmol, 100 µg Cr the same as CrP two time/day and 3) with 9.6 µmol, 500 µg Cr two time/day. These persons constant taken their drug as well as are educated not adjust their intake also way of life. HbA1c values enhanced considerably past two months in this group getting 19.2 pmol , 1,000 µg Cr/day also were poorer here equally groups; placebo, 19.2 µmol Cr past 4 months. Fasting glucose is lesser in the group of 19.2 µmol past two also four months. Glucose rate at 2-h are also much poorer for the group receiving 19.2 µmol Cr supplement past both two also four months. Fasting plus two hour insulin values decreases noticeably in equally groups taking Cr- supplement past two also four months. Total cholesterol in plasma was decreases later than four months in the persons getting 19.2 µmol Cr/day. The results proves that Cr supplement have obvious valuable effects on the variables; HbA1c, glucose, insulin, as well as cholesterol in persons with diabetes type 2. The chromium valuable effect in those with diabetes was observing at height over than the higher limit of the determinants of health globally [47].

In PCOS women, a 200 µg/day CrP get better the tolerance of glucose comparison by placebo except don't recover frequency of ovulation or hormonical factors. This research indicates the view study in PCOS peoples must check up high dosage or longest treatment durations [48].

1000 µg Cr ^{III} as CrP taken with no adjusted in the levels of activity and fasting, causes about 38% suggested advance in the rate of glucose in 5 fat persons through PCOS who are examined by a euglycemic hyperinsulinemic close method. This proposed the CrP, in excess of the oppose food product, possibly helpful like an sensitized for insulin in the PCOS treatment [49].

CrP can be efficient in resistant of clomiphene citrate compared with metformin at patients with PCOS. This random medical test is carried out via 92 patients with resistant of clomiphen citrate plus PCOS. The women are assigned randomly into 2 sets taken each 200 µg/day CrP otherwise 1500mg/day metformin for three months. The tests of anthropometric also hormonical profiles were calculated as well as comparing together previous to also past the management. The rate of pregnancy also ovulate are estimated in two sets. Fasting blood sugar, FBS extensively decreases via CrP past treatment for three months. In the similar technique, the serum fasting insulin levels have notably decreases lead to an increasing in sensitivity of insulin which was found as Quantitative Insulin Sensitivity Check Index, QUICKI index. The patients which obtained CrP comparing with other are taken metformin have much lesser testosterone levels also free testosterone (p=0.001) past treatment for three months. However, no important different among the 2 patients groups about ovulate be established also the rate of pregnancy. Generally, CrP was the better tolerate comparing with metformin; even so, the results illustrate not much difference about the rate of ovulate also pregnancy [50].

The CrP safety also efficiency was examine for HIV- related with resistance of insulin through random, twice-blind, placebo-control experiment by persons getting 500µg two times/day of CrP or placebo for 2 months. HIV- tainted patients are chosen according to the fasting glucose level of plasma was bigger the 5.5mmol/L or the glucose level of plasma was larger the 7.7mmol/L however fewer the 11mmol/L two hour past 75g of glucose oral intake. Sensitivity of insulin assessing through an excessive- insulinemic-euglycemic fasten also tolerance of glucose is assessing by the test of oral glucose tolerance. 34 patients are joining up plus 39 finished the procedure, twenty in Cr supplementation plus nineteen in the test of placebo. The data about chromium-supplement illustrate

that no important vary in each glucose tolerance also sensitivity of insulin. An important development in the HDL cholesterol level in serum with Chromium supplemented group was observed. CrP complementation show up a good tolerated at this limit, except generally it's not efficient treatment pro insulin resistance with HIV-injured patients [51].

A study summarizes the analysis data reported with 137 patients with PCOS women plus 131 healthy. A further five analysis confirmed non-important different in fasting insulin among chromium versus placebo otherwise further management. Two accidental also control testing in QUICKI be comparison with 156 women patients of PCOS among chromium plus placebo or additional behavior. Analysis of two RCTs illustrated no important different results among chromium group also placebo. Two random controlling experiments of comparing the Homeostatic Model Assessment-Insulin Resistance, HOMA-IR among chromium as well as placebo otherwise further managing in 81 PCOS patients subject. The results illustrate a considerably HOMA-IR inferior in the group of chromium. An RCT report showed a major different in the function of Homeostatic Model Assessment-beta cell, HOMA-B among chromium group versus group of placebo. No large produce of chromium is observed among fasting insulin results in women experience PCOS. Chromium supplement extensively bigger HOMA-IR also HOMA-B between diabetes suffered patients. The level of this cause is little; also the medical appropriate was unconvinced [52].

A efficient review also analysis give facts for Cr supplement for improved decreased fasting blood glucose levels, HbA1C concentrations, insulin resistance also insulin concentrations in T2DM subjects compared to the control group [53]. It has been known for some time that chromium improves glucose tolerance by reducing insulin resistance [54].

Several of T2DM metabolic features are comparable to PCOS; a various studies illustrate no effect of Cr supplements on weight decrease, control of glucose, lipid profile and hormone disorder for PCOS women [55].

The Chromium complement effect on rate of ovulation in PCOS patients was studied including 140 women alienated into two groups each one is 70 unfertilized women identified as PCOS relative to Rotterdam criteria 2017. After 3 months of treatment, the results illustrate not significantly dissimilar about rates of ovulation plus pregnancy [56].

The relation between PCOS with Mg, Zn, Se also Cr supplementations in childbearing age women with PCOS was studied and reviewed also the positive effect of minerals on the medical also metabolic PCOS signs [57].

For the purpose of estimating the relation between the levels of Cu, Zn, Cr, Cd, Se, Mn, Fe, Mg, Co, Ni and Pb trace elements and their association with PCOS pathogenesis, a measurements was made to discuss the change in the levels of these elements has been related to PCOS pathogenesis or not. The results showed that PCOS women has higher serum levels of Cu, Co, Cr and Fe also lower Se and Mg levels [58].

Minerals are able to counteract the effects of oxidative also inflammatory stress related to PCOS; so, Cr supplements may improve the PCOS pathologies. Since expected health hazard, care needs in recommending Cr supplement to PCOS women since, it is associated to oxidative stress, damage of DNA, gene instability also carcinogenesis [59, 60].

Owing to high bioavailability, salts of organic mineral like aspartate, gluconate or citrate might be a good choice for supplements [61].

The Cr element was high in the group of PCOS patients compared to healthy group despite taking nutritional supplements containing minerals and vitamins; this result contradicts what is known about the necessity of giving nutritional chromium supplements as part of the prevention and treatment of

this disease. The reason for these results may be due to the fact that most PCOS patients take a nutritional supplement known as Centrum [62].

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