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Research Article

STRATEGIES FOR THE USE OF INSULIN SENSITIZING DRUGS TO TREAT INFERTILITY IN WOMEN WITH POLYCYSTIC OVARY SYNDROME

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Abstract:

To establish the features of biochemical and clinical in PCOS (polycystic ovary syndrome) individuals using IR insulin resistance; and also to assess the insulin sensitizing drug role (in the shape of metformin as a drug) in the patients of infertile IR PCOS in regards to either reproductive or metabolic functionality.

The total number of patients is 55 and in these 55 PCOS women, with a preliminary ailment of infertility along with other demonstrations consist of hirsutism, obesity, as well as acanthosis nigricans (AN). In accordance with the ratio of fasting glucose/insulin (G/I), these 55 patients have been further categorized into two groups; the first one is Group I: IR PCOS and the second one is Group II: non-IR PCOS. Both groups' patients have been provided Clomiphene citrate (CC) for five days starting from the second day of the entire duration for six months.

Similarly, Group I was further categorized in line with medication protocol into Group Ia which was given metformin every day along with (CC) and Group Ib only offered CC.

BMI, Ferriman-Gallwey score as well as (G/I) were determined. Fasting insulin (I) and Fasting glucose (G), luteinizing hormone (LH), follicle-stimulating hormone (FSH), progesterone (P), testosterone (T), total cholesterol (TC) and triglyceride (TG) have also been assessed. The medical, as well as biochemical variables, have been examined at first and also at the completion of treatment. Sixty-two percent, as 34 of the 55 patients having PCOS experienced IR. Hirsutism, obesity, as well as AN, have been frequent relationship as part of group I. In group I, LH, LH/FSH as well as T have been notably reduced as compared with another group ($P > 0.05$). In group Ia, nearly all post-treatment variables have been importantly enhanced in comparison with group Ib with the ratio of ($P > 0.05$). IR-PCOS patients tend to be more inclined that they are overweight, hirsute and in addition have AN. They are additionally more resistant against ovulation induction along with CC. They usually have reduced levels of LH, LH/FSH and T. Metformin boost the reaction to ovulation induction with CC and the rate of pregnancy IR-PCOS. Moreover, it seems that metformin might be helpful while enhancing the metabolic variables linked with IR syndrome to ensure that it may decelerate or protect against the prolonged challenges with this disorder.

Keywords: PCOS; insulin sensitizing drugs; insulin resistance;

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INTRODUCTION:

Polycystic ovary syndrome (PCOS) happens in around four percent to six percent out of the female populace and could become the premier root cause of infertility in those of reproductive age group. PCOS reveals medically accompanied by a wide array of symptoms and signs; and the important are menstrual problems, hyperandrogenism, infertility, plus morbid obesity. The real pathophysiology includes not really been obviously elucidated; nonetheless, generally, there is actually developing deal which gonadotropin vibrant dysfunction, hyperandrogenism, as well as insulin resistance (IR) tend to be crucial attributes (Cheang & Nestler, 2004).

PCOS is definitely not a benign problem. That it might contribute to issues regarding glucose metabolism, dyslipidemias, type 2 DM, cardio disease, and endometrial cancer. The objectives involving therapy must concentrate on restoring menstrual regularity, reducing androgen excesses, as well as lowering IR. It has been recommended through many researchers that IR looks present in almost all PCOS patients. Nevertheless, other individuals have revealed that IR is certainly not the universal discovering, however, rather is exist in 40-70% of PCOS patients. The proportion of fasting glucose (G) in order to fasting insulin (I) has become certified as easy as well as a practical forecaster of insulin resistance in females with PCOS. Some other, additional invasive examinations like as insulin-glucose clamp research, intravenous glucose tolerance examinations, and also qualitative model indices, had been additionally characterized towards identifying IR (insulin resistance). It has been revealed in numerous global scientific studies, that the usage regarding insulin sensitizing agents like as metformin could enhance both the reproductive as well as metabolic variables in IR-PCOS patients (De Leo, 2018).

Insulin sensitizing agents (such as Metformin) may possibly assist in order to enhance menstrual irregularity, as well as restore spontaneous ovulation. Perhaps it will enhance the reaction to CC as well as other ovulation induction medications and reduce the level of hyperstimulation and initial pregnancy loss. Additionally, insulin sensitizing agents are being examined to its prospective long-term disease-modifying impact, such as for example prevention of afflicted glucose tolerance, overt diabetes, gestational diabetes, dyslipidemia, high blood pressure as well as the increasing threat of cardiovascular disease (Dunaif, 2008).

The basic goal of this research is first, to distinguished patients of PCOS with IR, as well as in the same way and without having IR; including to judge the feasible advantageous insulin sensitizing agent's role while managing the PCOS patients with IR with regards to both reproductive and metabolic functions (Franks, 2011).

MATERIAL AND METHODS

Institution:

This specific work was carried through at the obstetrics and gynecology departments, internal clinical and medical pathology, following the approvals from the concerned departments relating to this research and after acquiring the consents from the patients.

Patients:

The number of patients was 55 and all were infertile women having PCOS. The medical diagnosis of PCOS was developed judging by a minimum of two of the following three criteria: (1)- Anovulation (0.8 ng/mL) or clinical as research by hirsutism as well as/or serious persistent acne (2)- Polycystic ovaries (ten or over follicles determining 2-8 millimeters in diameter as well as/or improved ovarian volume to 10 mL or higher. Just one ovary fulfilling these standards is sufficient to meet up with the definition of PCOS.

The male element was omitted by carrying out a semen analysis. Tubal and peritoneal aspects had also been omitted by hysterosalpingography/laparoscopy. Some other demonstrations in addition to infertility in those fifty-five patients included hirsutism (54.5%) obesity (58%) and AN (14.5%). Almost all patients were categorized based on the existence or absence of insulin resistance utilizing (G/I ratio) were additionally categorized towards two groups as reported by the therapy protocol into Group Ia (n=20): have been provided insulin sensitizing (metformin) 1500 mg everyday by mouth along with 50 mg CC everyday by mouth just for five days starting up from day 2 of the period of progesterone induced menses. On the contrary, Group Ib (n=14): who have been provided CC alone in the same routine as group Ia. Accordingly, non-IR-PCOS (Group II) incorporated 21 infertile patients holding PCOS. The average age was 27 ± 5 years. Nearly all of them had been given CC in the same routine as group Ia.

The medication persisted for 6 months or until pregnancy occurred. Subjects who were unsuccessful to ovulate or conceive been given an incremental 50 mg dose up to 150 mg for 5 days. The biochemical

and clinical variables have been evaluated at first as well as at the end of treatment.

All patients have been subjected to:

- Comprehensive track record as well as in-depth clinical examination along with certain concentration on BMI (body mass index), acanthosis nigricans (AN), obesity, and hirsutism. Body Mass Index had been determined as body weight (Kg)/height (m) ². Accordingly, the definition of obesity was as BMI \geq 30 Kg/m². The existence or absence of AN being verified through characteristic velvety skin discoloration around the neck, groin or axilla, have been noticed. The assessment of Hirsutism performed by using FerrimanGallwey score (>8).
- The measurement of Fasting (G) performed through the glucose oxidase approach, as well as

fasting (I) determined with Chemiluminescent enzyme immunoassay.

- FSH, LH, T and P values hormonal assay had been determined through the use of Chemiluminescent enzyme immunoassay. Ovulation was identified through midluteal serum progesterone of > 10 (ng/mL). The biochemical and clinical variables have been evaluated at first as well as at the end of treatment.

RESULTS:

On the basis of G/I ratio < 4.5 mg/104 U, 34 women (62%) had IR (group I) and 21 (38%) had no IR (group II). The clinical characteristics of the patients in the two groups were similar regarding age, gravidity, and parity. Mean BMI, obesity, hirsutism and AN were significantly higher in group I than group II (P < 0.05) (Table 1).

Table 1. Clinical characteristics of 55 patients with PCOS.

	Age	Gravidity	Parity	BMI	Obesity%	Hirsutism%	AN%
Group I: IR (n=34)	29±4 yr	0.3±0.6	0.1±0.4	34.1±7.9	70.5	67.6	23.5
Group II: non-IR (n=21)	27±5 yr	0.3±0.7	0.2±0.5	30.2±4.6	38	33.3	0
P value	0.10	1.0	0.42	0.04	0.03	0.03	0.04
Significance	NS [†]	NS	NS	S*	S	S	S

*S: significant

†: non significant

As mentioned in above Table One, LH, LH/FSH, and T mean levels, have been significantly reduced in the group I like the comparison with group II (P < 0.05)

accordingly fasting (I) has been considerably elevated in group I as compared to group II (P < 0.05). (Table 2)

Table 2. Biochemical profile in IR (group I) and non-IR patients (group II) with PCOS.

	G (mg/dL)	I (μU/mL)	G/I ratio (mg/10 ⁴ U)	LH (mIU/mL)	FSH (mIU/mL)	LH/FSH	T (ng/mL)
Group I: (no=34)	93.2±11.8	28.5±6.8	3.3±0.8	10.4±6.6	5.3±1.1	2.0±1.0	54.8±29
Group II: (no=21)	85.1±12.2	12.1±5.4	7.5±3.4	15.2±10.1	5.8±1.6	2.6±1.1	72.0 ±26
P value	0.02	0.01	0.01	0.04	0.175	0.04	0.03
Significance	S	S	S	S	NS	S	S

For the determination of ovulation rates in group Ia and II, after the medication of six months, have been considerably elevated as compared with group Ib (P > 0.05). Rates of pregnancy have also higher in

groups Ia and II as a comparison with group Ib but not to a significant ratio (as mentioned in below Figure 1).

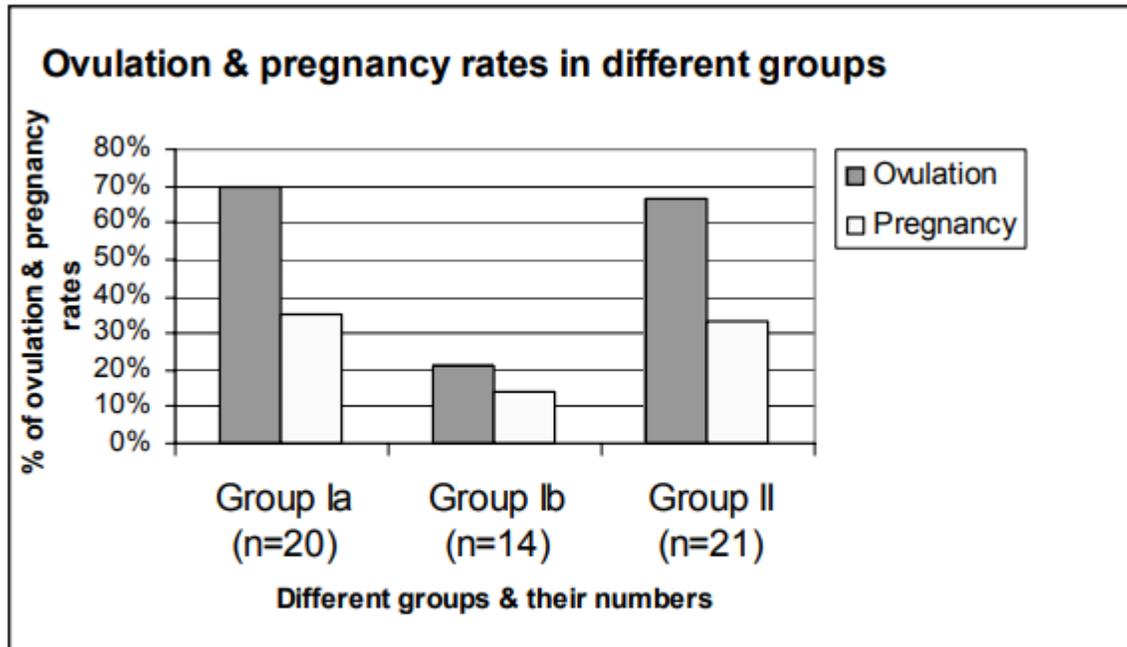


Figure 1. Ovulation and pregnancy rates in different groups

Below mentioned Table 3 declares the pre- and post-treatment variables in group Ia who were on insulin sensitizing agent (metformin) + CC. There have been important enhancement regarding ovulation, LH, LH/FSH, T and pregnancy rates ($P < 0.05$). There have also been important enhancement regarding mean levels of fasting (I), BMI, TG and TC ($P < 0.05$).

Table 3. Comparison between pre- and post-treatment with metformin + CC for six months in IR-PCOS (Group Ia)

	Pre-treatment	Post-treatment	P	Significance
Ovulation	0%	70%	0.01	S
PR	0%	35%	0.01	S
LH	10.8±6.4	4.3±1.2	0.01	S
LH/FSH	2.1±0.9	1.4±0.5	0.01	S
T	57.6±26	43.2±17	0.04	S
I	28.2±4.5	10.7±4.4	0.01	S
BMI	34.1±4.2	28.1±4.6	0.01	S
TG (mg/dL)	250±10.5	194±56	0.01	S
TC (mg/dL)	225±15.6	177±19	0.01	S
Hirsutism	55.2%	51.1%	0.95	NS

Below mentioned Table 4 represents the pre- and post-treatment constraints in group Ib which was utilized CC alone. There was no important improvement established in either reproductive or metabolic parameters ($P > 0.05$)

Table 4. Comparison between pre- and post-treatment results with CC for six months in IR-PCOS (Group Ib)

	Pre	Post	P	Significance
Ovulation	0%	21.4.%	0.22	NS
PR	0%	14.2%	0.47	NS
LH	10.8±6.4	7.3±3.2	0.07	NS
LH/FSH	2.1±0.2	1.8±0.3	0.06	NS
T	54.8±26	54.8±6	1.00	NS
I	27.1±4.1	27.7±3.4	0.67	NS
BMI	34.1±5.8	34.1±4.3	1.00	NS
TG	254±10.5	247±11.1	0.98	NS
TC	222±15.6	225±29	0.73	NS
Hirsutism	56.3%	55.1%	0.75	NS

Below mentioned Table 5 represents the post-treatment factors in group Ia and Ib about both reproductive and metabolic functions. There has been an important enhancement in reproductive parameters (ovulation, LH, LH/FSH, T) and metabolic

parameters (I, BMI, TG, TC) ($P > 0.05$) in Ia group as comparing with Ib group but there is lacking important variation in the pregnancy rates or hirsutism.

Table 5. Comparison between post-treatment results in IR-PCOS patients after the use of metformin +CC (group Ia) and CC alone (group Ib) for six months.

	Ovulation	Pregnancy	LH	LH/FSH	T	Hirsutism %	I	BMI	TG	TC
Group Ia: Metformin+CC (no:20)	70 %	35%	4.3±1.2	1.4±0.5	43.2±17	51.1%	10.7±4.4	28.1±4.6	194±56	177±19
Group Ib:CC (no:14)	21.4 %	14.2%	7.3±3.2	1.8±0.3	54.8±6	55.1%	27.7±3.4	34.1±4.3	247±11.1	225±29
P value	0.01	0.34	0.01	0.01	0.02	0.90	0.01	0.01	0.01	0.01
Significance	S	NS	S	S	S	NS	S	S	S	S

DISCUSSION:

PCOS is known as a common reason for female infertility. Not too long ago, IR happens to be distinguished as an effective and important discovery in this disorder. The occurrence of IR in patients with PCOS was found to become adjustable in numerous studies. Dunaif et al. demonstrated insulin that is reduced in 38% of PCOS clients while Legro et al demonstrated IR in 53per cent of non-Hispanic overweight PCOS females. IR had been additionally discovered to occur in 41percent of PCOS clients. In this variety of clients, it has been observed that IR in 34 away from 55 patients with PCOS (62%) in Pakistani women. Designating PCOS clients as either IR or non-IR can enable contrast of typical parameters involving the two teams. Although IR is present in both overweight and PCOS that are lean

obesity is known as a risk factor for IR (Hoeger, 2012).

In this current research mean BMI in IR group was considerably greater than as compared with IR patients as well as the incidence of obesity in IR patients (70.5%) had been somewhat more than non-IR people (38%). The relationship between obesity and IR just isn't an incidental one, as extra insulin may increase obesity that is central which often, worsens IR (Katsiki, Georgiadou & Hatzitolios, 2009).

“AN” is a certain manifestation that is clinical of. This is often noticed in the groin, axilla, and neck. “AN” is as a result of the affectation of insulin regarding the basal cells of the epidermis. The

association that is significant “AN” and” IR” once was reported. “AN” was significantly higher in the IR group compared with non IR one in this current study. The findings that are biochemical this variety of clients revealed a lower life expectancy circulating total testosterone amounts in IR than non-IR (Katsiki, Georgiadou & Hatzitolios, 2009).

The elevated level of insulin in IR subjects may reduce SHBG levels which end up in high testosterone that is free. This free testosterone gives an explanation for the greater prevalence of hirsutism in IR group. Hirsutism is amongst the medical symptoms of hyperandrogenism. The association that is significant hirsutism and IR had been noticed in this variety of clients and also other researches (Kim, Taylor & Barbieri, 2000).

The levels of LH and LH/FSH ratios were also significantly lower in the IR group compared with non-IR one in the current study. This low LH amounts also can explain reduced testosterone that is circulating in the IR group. This choosing of low LH amounts in collaboration with high insulin amounts agrees with previous reports suggesting two feasible various subtypes of PCOS clients, a low-LH and high-insulin type and a high-LH and type that is low-insulin. This observation once more supports the necessity to sub-classify PCOS patients into IR and groups that are non-IR (Ortega-Gonzalez, 2005).

IR and hyperinsulinaemia that is compensatory prevent follicular development and ovulation as a consequence of hyperandrogenic intraovarian microenvironment and also by changing gonadotropin release. This state of chronic anovulation describes demonstrably the pregnancy that is low in PCOS clients. In this variety of patients there clearly was a difference that is a significant reaction to CC and afterwards, the ovulation between PCOS clients with no IR weighed against PCOS clients with IR whenever offered equivalent routine of CC therapy (PASQUALI & GAMBINERI, 2006).

This means PCOS clients with IR are far more resistant to ovulation induction with CC weighed against non-IR clients. This observation once was seen in other studies. Mor et al stated that females with IR had been significantly more than 5 times as probably be resistant to CC as females lacking IR. These findings declare that IR must certainly be designated as a distinctive team in PCOS which could maybe get good results from making use of insulin-sensitizing representative such as for example metformin to ameliorate hyperandrogenism and chronic anovulation (Stadtmauer, 2016).

CONCLUSION:

It seems that regular description of IR in PCOS subjects to distinguish them as either IR or non-IR may be of assistance in the domains of instructional research and scientific practice. IR patients are holding a lot more obesity, hirsute and also have AN. They are inclined to be additional resilient to CC for induction of ovulation. They likewise have lower LH, LH/FSH proportions, and testosterone values. It tends that reversal of IR (insulin resistance) in PCOS with drugs having features of insulin sensitizing comprises the essential objective in the handling of hyperandrogenic anovulatory infertility as well as also in the protection of long-term effects and should always be incorporated in the array of therapeutic options. So, insulin sensitizing agents such as metformin seem to be a drug along with numerous curative impacts far beyond its effect on lowering blood glucose in diabetes mellitus.

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