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CROSS-SECTIONAL ANALYSIS OF INTER-RELATIONSHIP BETWEEN INSULIN RESISTANCE AND HYPERTENSION AMONG PATIENTS AT LIAQUAT UNIVERSITY HOSPITAL

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Abstract:

Background:

Insulin resistance and hypertension often stem from the same genotypic and phenotypic phenomenon. It is well established that a sedentary lifestyle, and a plentiful diet rich in sodium and energy are the likely culprits that over the years have contributed to the rise of both ailments. However, the inter-relationship too is worthy of exploration.

Objective:

This research hopes to study the inter-relationship between insulin resistance and hypertension among patients by eyeing the co-presentation of both diseases in patients and by evaluating the time elapsed in diagnosis of each disease to assess which disease preceded the other.

Methods:

This observational was carried out on patients presenting at the medicine outpatient department of Liaquat University Hospital with a joint complaint of insulin resistance and hypertension from 1st Dec 2015 to 10th February 2016. Data was collected using an interview based structured questionnaire administered to the patients after taking written informed consent. The data was analyzed in SPSS v. 16.0.

Results:

During the course of the study, a total of 248 patients presented with the complaint of insulin resistance, 356 patients presented with the complaint of hypertension. While 136 patients presented with a joint complaint of insulin resistance and hypertension. Majority (70.588%) of the patients reportedly developed insulin resistance prior to developing hypertension. The chief complaint of 120 (88.24%) of the patients was insulin resistance. 42 (30.88%) of the patients, despite suffering from hypertension, were not taking treatment.

Conclusion:

The inter-relationship of both diseases is marked. For every 10 patients suffering from insulin resistance, 3.7 suffered from hypertension as well. While for every 10 patients suffering from hypertension, 2.8 suffered from insulin resistance as well. Thus patients suffering from insulin resistance are more likely to be hypertensives.

Keywords: *Insulin resistance, Hypertension, Cardiac comorbidities, Diabetes and Insulin.*

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INTRODUCTION:

For nearly 4 decades now, presence of hyperinsulinemia in normo-glycemic individuals with hypertension is seen often in clinical practice. More often than not, such patients are ought to become insulin resistant[1]. Ferrannini too established this by revealing that slender individuals with hypertension living in predominantly white regions had lesser insulin-controlled glucose clearance as compared to normal controls[2]. Thus the belief, that insulin resistance and/or insulin alone may play an important factor in the hypertension pathogenesis[3]. Many researchers have explored the matter and Reaven GM has shown that Insulin is capable of stimulating the sympathetic nervous system, hiking up the retention of sodium by kidneys, controlling transport of cations, and inducing hypertrophy of vascular smooth muscles[4]. It is conceivable that through associated compensating hyperinsulinemia, insulin resistance participates in the hypertension pathogenesis by solely this or other such mechanisms. Regardless, short-term insulin injection was discovered to be a hypotensive vasodilator instead of an effective hypertension inducing agent[5].

In order to settle these conflicting interpretations, it was proposed that resistance to insulin may cause hypertension due to hampered vasodilation induced by insulin and an upset between its depressor and pressor effects[6,7]. Even though a vast quantity of researches investigated the inter-relationship between hypertension (blood pressure) and insulinemia, the evidence has been incoherent with few claiming marked and others insignificant, or no link[8,9]. A lesser quantity of researches gauged resistance to insulin directly, majorly in little groups of individuals but with incoherent results too[10]. (Pollare T, 1990 and Mattiason 1992). In this article, we discuss the inter-relation between insulin resistance and hypertension at an out-patient department of a large tertiary acre hospital catering to the needs of patients from a diverse sociodemographic background.

METHODOLOGY

This observational was carried out on patients presenting at the medicine outpatient department of Liaquat University Hospital with a joint complaint of insulin resistance and hypertension from 1st Dec 2015 to 10th February 2016. Data was collected using an interview based structured questionnaire administered to the patients after taking written informed consent. Queries were made about patient's bio data, sociodemographic and educational variables, complaints of patient, duration of disease and order of disease developed across a given period of time. Insulin resistance was diagnosed on the basis of poor response to insulin therapy by the help of Oral Glucose Tolerance Test and serial Fasting Blood Sugar tests. The data was analyzed in SPSS v. 16.0.

RESULTS

During the course of the study, a total of 248 patients presented with the complaint of insulin resistance, 356 patients presented with the complaint of hypertension. While 136 patients presented with a joint complaint of insulin resistance and hypertension.

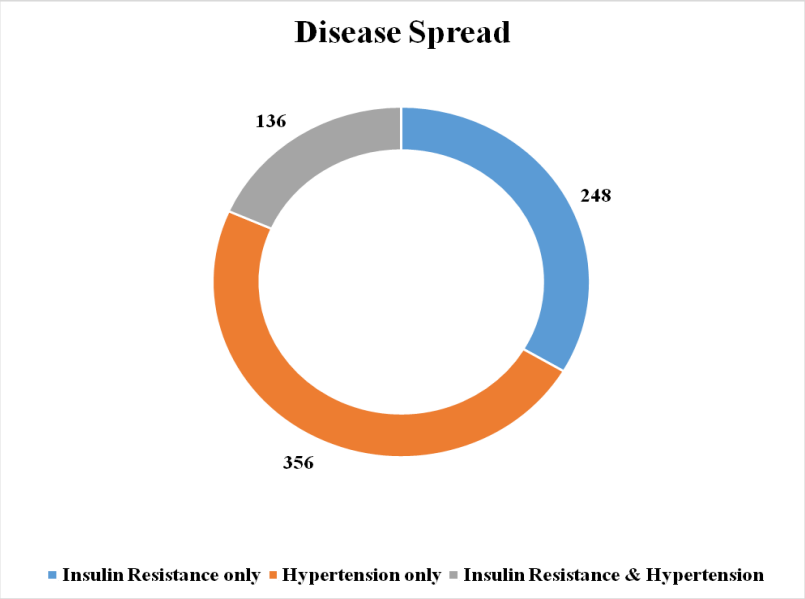

Fig 1: Incidence of presentation of hypertension was more common than insulin resistance. However, a greater propensity was seen among patients suffering from insulin resistance to develop hypertension.

Majority (70.588%) of the patients reportedly developed insulin resistance prior to developing hypertension.

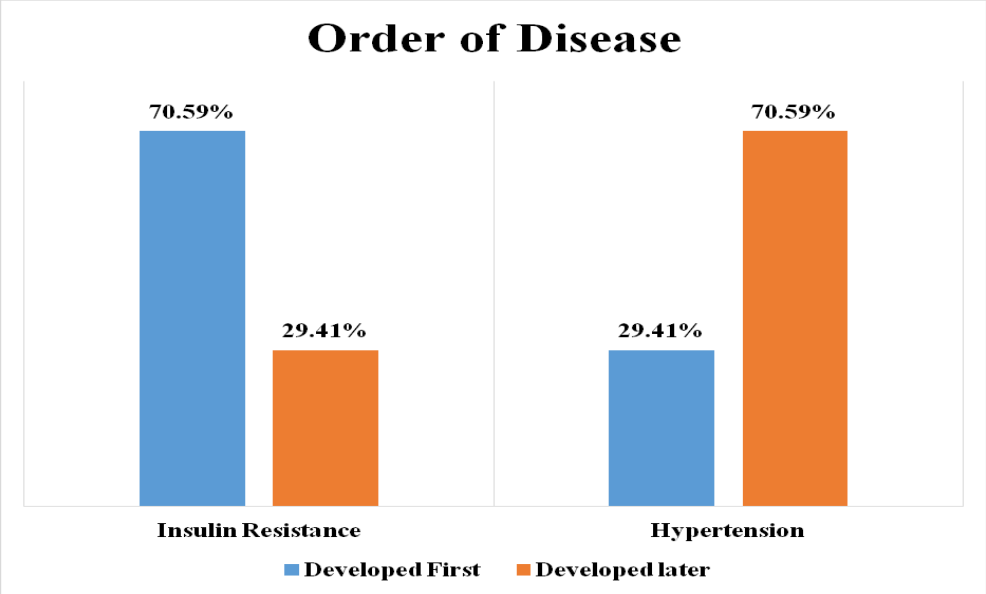

Fig 2: In addition to greater propensity of patients suffering from insulin resistance to develop hypertension, it was seen that patients suffering from both diseases simultaneously, more often than not initially developed insulin resistance prior to developing hypertension.

The chief complaint of 120 (88.24%) of the patients was insulin resistance. 42 (30.88%) of the patients, despite suffering from hypertension, were not taking treatment.

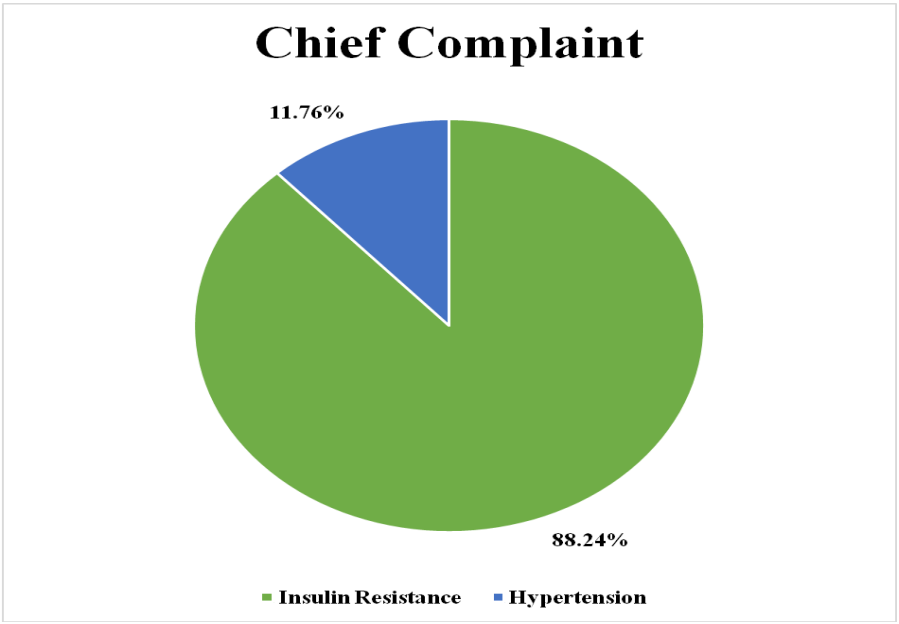

Fig 3: The chief complaint, as regarded by the patients themselves was Insulin resistance in many of the subjects suffering from both the diseases. This may be due to the symptoms of insulin resistance since they affect health related quality of life (HRQoL) to a greater extent.

The inter-relationship of both diseases is marked. For every 10 patients suffering from insulin resistance, 3.7 suffered from hypertension as well. While for every 10 patients suffering from hypertension, 2.8 suffered from insulin resistance as well.

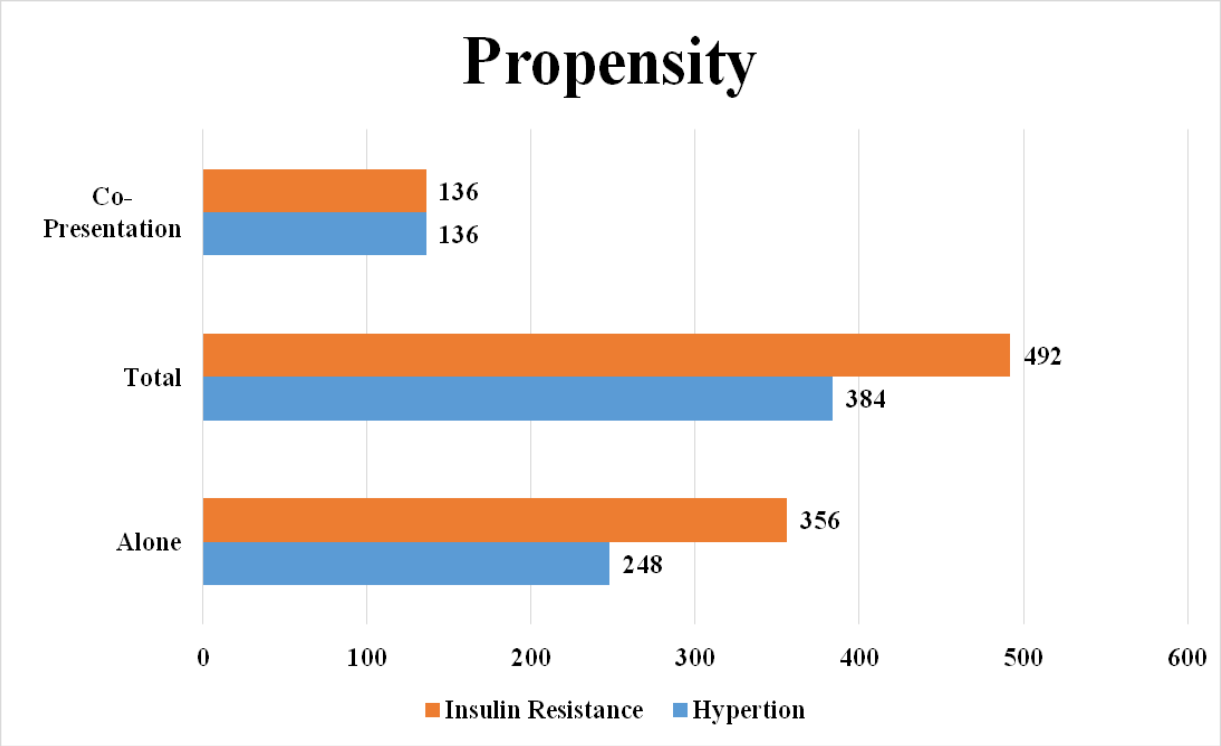

Fig 4: The probability of the disease development is shown above and it indicates that patients suffering from insulin resistance are more likely to be hypertensives.

DISCUSSION:

The link between insulinemia and resistance to insulin and hypertension is conflicting, at best. However, a few researches claimed that resistance to insulin and/or hyperinsulinemia were markedly linked to hypertension, others claim only an insignificant or a total lack of association[7].(Ferrannini, 1997 and Mattiason I, 1992). Our data adds to the pool of this literature, some significant findings that may prove to be an essential building block for further interventionist research.

It is noteworthy, yet, that many antihypertensive drugs may further aggravate resistance to insulin (Coates PA, 1995) and that we may not gauge the effect of medication due to the observation, non-descriptive nature of the research. In addition to that, the amount of individuals suffering from hypertension but not receiving drugs (due to symptoms that are less worrying) was too little to allow investigation of the results individually.

The inter-relationship between hypertension and resistance to insulin seems to differ between ethnicities in foreign evidence based researches. Almost all research exhibiting a marked link between blood pressure and insulin are carried out in non-Hispanic females. Research in African Americans, Hispanics, Nauruans, Pima Indians, and Asian subjects exhibited an insignificant or a total lack of association. (Heisa T, 1998). Even in NHW, the link between blood pressure and insulinemia was incoherent with a few of the researches claiming a less marked link.

The pathway via which resistance to insulin is linked to hypertension and blood pressure is unknown. It is believed that resistance to insulin may lead to hypertension via compensating hyperinsulinemia.[3] (Reaven GM, 1987). Insulin has been revealed to up-surge the sympathetic nervous system, hike sodium retention by kidneys, modulate transport of cations, and bring about hypertrophy of vascular smooth muscle.

The results do not second the belief since insulin had no independent relation with hypertension or blood pressure. The fact that insulin could lessen blood pressure markedly in diabetics suffering from neuropathy (autonomic) has been known for many years. (Paife M, 1986). Furthermore, administering insulin to people (regardless of whether they suffer from diabetes) does not lead to a hike in blood pressure in absence of hypoglycemia. However, it is

possible that it is the hike in blood pressure may be due to resistance to the vasodilator effect of insulin.
Moreover, resistance to insulin has been linked to reduced endothelium-dependent vasodilatation, which may be responsible for hiking up the blood pressure. Meanwhile, the link between hypertension and resistance to insulin may not be as simple as we perceive and rather, they may not be associated directly through pathways of an acquired or inherited nature.
While on one hand, increased adrenergic tone could bring about a hike in resistance to insulin and a hike in blood pressure on the other. Racial and ethnic disparities in the activity of sympathetic nervous system may shed light on the contrasting inter-relationship of resistance to insulin and blood pressure. A hike in the inflammatory markers levels such as tumor necrosis factor may play an important role in resistance to insulin and dysfunction of the endothelium and trigger the inter-relationship between hypertension and resistance to insulin.

CONCLUSION:

This study concludes that the inter-relationship of both diseases is marked. For every 10 patients suffering from insulin resistance, 3.7 suffered from hypertension as well. While for every 10 patients suffering from hypertension, 2.8 suffered from insulin resistance as well. Thus patients suffering from insulin resistance are more likely to be hypertensives.

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