

ASSESSMENT OF RISK FACTORS FOR DIABETES MELLITUS AMONG THE INFERTILE FEMALE FROM HYDERABAD SINDH

Dr. Naheed¹, Dr. Nadir Ali Shah², Hafiz Dr. Moazam Hussain^{*3}

¹Department of Zoology, University of Sindh, Jamshoro, 76080, Sindh-Pakistan

²Assistant Professor

^{*3}Health services academy Islamabad

¹naheed.shah@usindh.edu.pk, ²nadirshah99@gmail.com,

^{*3}Sardar.moazam10@gmail.com,

<https://orcid.org/0000-0003-3060-4289>

<https://orcid.org/0000-0001-8326-8843>

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Corresponding Author: *
Hafiz Dr. Moazam Hussain

Abstract

Infertility due to diabetes mellitus is a common disorder in general practise that can have a major effect on young women's quality of life. The current study was conducted on 90 women in three major Hospitals in the province of sindh, Pakistan for four months from August 2018 to December 2018. These Hospitals were LUMHS Hyderabad, DHQ Tando Muhammad Khan and DHQ TandoAllahyar. Specific questionnaire were developed to the participants. The main focus of the study was intended on emergence of metabolic disorder of diabetes mellitus. Out of 90 patients 21were diabetes mellitus, result is supported by the study conducted by the Tobias et al,(2015), which showed that women reporting infertility 20% more risk to due diabetes mellitus. Further it is revealed that due to Diabetes mellitus risk of ovulation disorder endometriosis is common.

INTRODUCTION

In the second decade of this new millennium, the rates of infertility remain highly prevalent globally as it is estimated to affect the reproductive aged couples all over the world. In some of the regions of the world, rates of infertility are higher as compared to others including sub-Saharan Africa, South Asia, Middle East, Central Asia, Eastern Europe and North Africa. The current research has been conducted by exploring the risk factors among infertile women for diabetes mellitus from Hyderabad, Sindh. Furthermore, according to Inhorn and Patrizio (2015), women with diabetes showed that the reproductive abnormalities such as increase incidence of menstrual cycle irregularities and delayed menarche are the most

common reproductive abnormalities among women. However, with the refinement of insulin therapy, these impacts of infertility might be reduced (Livshits and Seidman, 2009). The presence of type 1 diabetes in pregnant women is linked with the adverse effects observed on the fetal outcomes such as congenital malformations among women with diabetes. The research by Wang et al. (2017), explored the conditions of reduced rates of infertility including Polycystic ovary syndrome (PCOS), Microvascular and cardiovascular complications, Secondary amenorrhea (absent periods), Premature menopause (premature ovarian failure), Oligomenorrhea (irregular periods) and

Endometrial cancer (uterine cancer). Additionally, it was identified that the factors contributing towards the diabetes among infertile women include being underweight, obesity, PCOS and having an autoimmune disease (Lin et al., 2019). This research has although explained the causes of diabetes mellitus among women but a gap was observed with respect to the impact risk factors for diabetes mellitus on the female infertility. Therefore, the current study has been carried out with an aim to address the identified gap to identify the reasons pertinent to increasing rates of diabetes among infertile women from Hyderabad, Sindh.

Background

Fertility Issues in Women with Diabetes

As analysed in the research by Livshits and Seidman (2009), Type 1 and Type 2 diabetes mellitus should be considered as the main causes in the different diagnosis for infertility and menstrual abnormalities among women. Due to premature menopause and delayed menarche, the reproductive period of diabetic women may be reduced as during the years of reproduction diabetes is identified to be directly linked with the menstrual abnormalities such as secondary amenorrhea and oligomenorrhea. Additionally, in the words of Lin et al. (2019), one of the most common medical conditions is diabetes as both type 1 and type 2 diabetes are directly associated with the lower fertility rates and menstrual irregularities. The reproductive phase of a woman with diabetes is considerably shorter as compared to the one with no diabetes which in turn causes crucial issues in conceiving and carrying the baby. It was found in the research by Livshits and Seidman (2009) that the prevention of diabetic complications and better glycemic control are effective with respect to improving the rates of fertility and reducing irregularities in menstruation among women. However, despite of the adequate treatment and increasing rates of fertility observed in the general population women with persistent menstrual abnormalities need to be approached for better evaluation of hormonal status, presence of antiovarian autoantibodies, autoimmune thyroid disease and

hyperandrogenism. Furthermore, Lin et al. (2019) conducted a cohort study by using data from the Taiwan National Health Insurance Research Database. The research assesses the diabetic growth with type 1 diabetes aged between 16 and 30 years by sex, income, gender, and urbanisation. Besides, the endpoints included abortions, live births, and fertility, in addition, it was also reviewed that the influence of diabetic ketoacidosis, diabetic complications, daily insulin dose and autoimmune thyroid disease is significant on the infertility of women. The results revealed that the major issues which impact on female fertility include the associated hyperthyroidism, thyroid function surveillance and blood glucose.

Risk Factors for Diabetes Mellitus among the Infertile Female

According to Wang et al. (2017), one of the most common pregnancy complications is gestational diabetes mellitus which is related with the blood glucose concentrations identified to be greater than ≥ 5.8 mmol/L during pregnancy. As per the American Diabetes Institution, this affects the 10% of pregnancies worldwide approximately with the escalating prevalence of obesity and overweight due to reduced exercise and increased diet among women at the reproductive age. These are identified as the key factors for diabetes mellitus among infertile women as it has suggested that these can be potentially important for the long term metabolic risk for the mother as well as her offspring (Wang et al., 2017).

In the research by Inhorn and Patrizio (2015), the factors contributing towards diabetes mellitus among women with infertility include older maternal age at pregnancy, obesity, poor diet, pre-pregnancy overweight and low physical activity. Apart from this, infertility is defined as an absence of conception during more than 12 months with an attempt to pregnancy. Globally, there are 12-30% of couples who are suffering from the issues of infertility which may be attributed to the diverse factors including endometriosis, ovulatory disorders, tubal blockage, and polycystic ovary syndrome (PCOS). These were identified for gestational diabetes mellitus however risk factors for type 2 diabetes mellitus were identified as inflammation, dyslipidaemia and obesity-related

metabolic disturbances such as insulin resistance (Inhorn and Patrizio, 2015). Evidence in the research by Tobias et al. (2015) presented that a greater type 2 diabetes risk is observed among women with PCOS however the relationship of other causes of infertility diagnosis such as cervical factors and tubal blockages are linked with the subsequent diabetes risk. On the other hand, few studies have suggested that the possible infertility risk factors include the lifestyles and body weight (Lin et al., 2019). It was examined that women with the rates higher infertility are pertinent to the factors of smoking status, age, family history of diabetes, oral contraceptive use alcohol intake, postmenopausal hormone use and total physical activity being one of the few reasons for diabetes mellitus (Jonasson et al., 2007).

Objectives

- To assess the main fertility issues found in women with diabetes
- To identify the risk factors for diabetes mellitus among the infertile female.
- To examine the impact of risk factors for diabetes mellitus on the female infertility.

Methodology

This section is devoted to the explication of the research methods and analysis techniques adopted to conduct the study on “Assessment of risk factors for diabetes mellitus among the infertile female from Hyderabad, Sindh”. Since this research is of crucial importance in medical science, therefore, the selection of research method is done on the basis of maximum authenticity, precision of data interpretation, and data reproducibility. Therefore, this section elaborates on the basic philosophy employed to design the research, its approach, data collection as well as analysis techniques. The methodology segment of this research also defined the framework that is linked and connected with the specific set of paradigmatic assumptions that were utilised to carry out this research. Furthermore, the research methodology was utilised suitable methods for the achievement of the research objectives of the study.

Research Philosophy

According to Bajpai (2011), the philosophy of a research signifies the method of data collection, its interpretation and utilization towards conclusion. The examination of Levinson (2017) explicated that philosophy of any research can be classified into four categories i.e. Pragmatism, Positivism, Realism and Interpretivism. Ørngreen and Levinsen (2017) further show that the philosophy of pragmatism is based on the idea that the complete reality cannot be elaborated through a single perception or detail. It propounds that different interpretation to the world exist, all of which could be equally valid (Fletcher, 2017). Furthermore, the philosophy of pragmatism allows for both objective and subjective perceptions and interpretations. Therefore, Ulmer (2017) asserts the Positivism philosophy of research to base the arguments on factual knowledge. Positivism considers science and the scientific method as the most efficacious tool to explore the truth (Gabriel, 2015). Basias and Pollalis (2018) cite that the positivist philosophy allows for impartial data interpretation to conclude objective results. Conversely, philosophy of interpretivism facilitates in incorporating researcher's own interpretation into the study findings, which is often deluded due to diverging data.

This research was conducted on the strict premise of female infertility and concomitant risk of diabetes mellitus in the province of Sindh, Pakistan. In this respect, the study examined various qualitative and quantitative perspectives on metabolic disorders and its relations with female infertility. Therefore, the philosophy of interpretivism provided most conducive platform for the researchers to form hypothesis, collect relevant data from medical centers in the province, analyse patients, and form conclusions in light of the findings from literature.

Research Approach

The research approach is the segment which is concerned with the approach of the investigator towards solving each aspect of the study. In this process, the researcher holistically examines the underlying theme, focuses on the relevant ideas,

forms basic platform from literature studies, forms hypothesis, and designs the experiments (Moen, 2006). The designing of experiment should be in such a manner that it minimises intrinsic, human, and systemic biases and errors from the research process, and maximises consistency, authenticity, and reproducibility of the research conclusions (Moen, 2006).

Among the two classes of approach for study i.e. inductive and deductive, the inductive approach is used in this venture. Zalaghi and Khazaei(2016) explained that inductive approach as bottom-up research methodology, through which broader ideas are examined and as the research continues, the researcher narrows down to reach an authentic and informative conclusion. Through this manner, literature theories, concomitant principals are examined in the context of the research topic, in order to develop a valid study (Moen, 2006). Thus, an inductive approach was adopted for this study. This approach facilitated in using the benefits of the gathered data from Sindh's hospitals, assess their underlying relation with patient treatment, evaluate the factorial relationships between diabetes mellitus and female infertility, and also covered the indirectly related variables which could influence the outcomes.

Research Design

The design of the research is concerned with the manners in which the basic infrastructure of the study is planned and constructed. This infrastructure involves the themes and hypothesis of the study, evaluation of contemporary and relevant literature, selection of literature, selection of the types of data, research methodologies, and data collection and analysis (Lewis, 2015). According to Creswell and Creswell (2017), research design can be categorised into Qualitative and Quantitative designs. In this, the qualitative research design encompasses examination of phenomenon which have significant element of qualitative inclusion. It also involves the presence of human elements, through which the final outcomes could be influenced. Conversely, quantitative designs help in mitigating systemic and human biases from the research process, thus

allowing for a more authentic and reproducible outcome (Creswell and Creswell, 2017). However, quantitative design is only possible when substantial amount of relevant literature and current data is available, which certainly eliminates the need of human interpretation.

This research involved analysis of significant number of female infertile patients from major hospitals for Sindh, therefore from the initial stages, it focused on quantitative elements. Moreover, patients were analysed for their experience with diabetes mellitus and other metabolic dysfunctions, which was only possible through close examination of their personal accounts without the threat of human biases. Therefore, the investigator opted for a quantitative research design.

Data Collection and Analysis

For this research, data was collected from a sample of 90 female infertility patients, in three hospitals in Sindh i.e. LUMHS Hyderabad, DHQ Tando Muhammad Khan, and DHQ TandoAllahyar. Patients were inquired through a survey questionnaire which investigated about their lifestyles, experience with diabetes mellitus and other metabolic disorder related to infertility, and their perception about the entailing treatment. A period of four months, from August, 2018 to December 2018, was selected as the time frame for observation, and structured questionnaire was designed to approach the participants, as attached in the appendix. Frequency analysis was conducted through statistical means to analyse the data and its variations with the patients and hospitals.

Results

This research was intended to focus on emergence of metabolic disorders, diabetes mellitus in particular, and its relation with infertility in women. For this purpose, the research analysed 90 women patients in three major hospitals in the province of Sindh, Pakistan for four months. The study collected participant's responses in lieu of their experiences with the disorders and the kind of treatment they received or were receiving at the time of interview. According to the European

Society on Human Reproduction and Embryology (ESHRE), infertility is defined as a handicap which restricts people from achieving basic and important life goals, from a societal perspective. Furthermore, it is shown by Boivin (2015), that although infertility itself does not correlate with any other complications, however, it has significant relationship with individuals' mental well-being. This is attributed to the people's perception of the society as a sum of each contributions. And for a large population, this contribution often manifests in the form of their children, which form the underlying strata of the next generation of society. Although, some studies indicate that around 15% of couples i.e. 48.5

million couples (Agarwal et al., 2015). In this, although it is estimated that male's infertility contributes to around 20-30% of sole cases, however, it is also shown that around 30% cases are caused by both males and females factors (Agarwal et al., 2015). Global data regarding female infertility is scarce, especially in the context of its relation with other medical conditions that specifically women face. In a country like Pakistan, this scenario is worsen due to lack of infrastructure for consistent data collection on the subject. From literature survey, this study found the following prominent metabolic factors behind male and female infertility



Figure 1. Male and female infertility associated with bodily disorders (Author, 2021)

From this pictorial, it can be deduced that compared to males, females are significantly more vulnerable to infertility due to sheer variety of medical conditions specific to their anatomy. Furthermore, Song et al. (2014) highlights that female body has intrinsically more capacity to store fat, which is crucial for child birth and sustenance. However, in times of no-pregnancy, this high level of fats gradually restricts blood flow in certain regions related to hormonal development (Song et al. 2014). It also restricts bodily mobility, thus

gradually decreasing physical activity in women, which in turn, causes bone and muscle deterioration.

From the analysis, it was found that out of 45 patients in LUMHS Hyderabad, 28 reported associated metabolic disorders. Whereas, in DHQ Tando Muhammad Khan and DHQ Tando Allahyar, this proportion was 11 out of 23 and 04 out of 12, respectively. Thus, indicating an average of approximately, 47.7% of the total cases, as shown in the Table 1.

S#	Name of Hospital	NO. of Infertile Females	Infertile Females with associated metabolic disorder
1	LUMHS Hyderabad	45	28
2	DHQ Tando Muhammad Khan	23	11
3	DHQ Tando Allahyar	12	04

Table 1. Proportion of infertile women facing metabolic disorders (Author, 2021)

Meanwhile, it was also revealed that out of 43 female infertility patients, 21 reported a case of diabetes. This result is supported by the cohort study conducted by Tobias et al. (2015), which showed that women reporting infertility experienced a 20% more risk to developing diabetes. Furthermore, it was revealed in this study that the causes of infertility associated with higher risk for diabetes involved ovulation disorders, cervical factor, and endometriosis. In this context, the fertility period of diabetes-vulnerable women may be reduced, which is associated with menstrual abnormalities such as oligomenorrhea and secondary amenorrhea. Therefore, better

regulation of glycemic functions may help in reviving the fertility rates (Tobias et al., 2015). However, there were also seen cases in which patients experienced no improvements in their fertility even after timely and effective diabetic treatment. For this, a considerable broader perspective is required, which would involve the connection between pituitary gland, ovaries, and the hypothalamus.

Further evaluation on questionnaire regarding variations in metabolic disorders indicated that a female patient reported multiple complications, with other patients varying in major conditions, as indicated in the Table 2.

Metabolic Disorders	Percentage of infertile patients affected
Polycystic ovary syndrome (PCOS)	62%
Diabetes	48%
Malnutrition	44%
Obesity	30%

Table 2. Percentage of infertile women associated with individual disorders (Author, 2021)

The cases of metabolic disorders associated with female infertility were highest in Hyderabad, followed by Tando Muhammad Khan and the least in TandoAllahyar. Although this might be attributable to some genetic as well as socioeconomic conditions of the region. However, more in-depth study is required to cover this domain.

Discussion

This study highlighted the vital link between diabetes mellitus and other metabolic disorders and its prevalence in female infertility. In this context, it is to be noted that the relation between the two is two-way. Firstly, infertility is indicated to be responsible for several other metabolic disorders. In addition, female infertility is also related to be associated with severe mental stresses on women, which often originate from societal pressure on the gender, compared to men. The presence of type 1 diabetes in pregnant women is linked with the adverse effects observed on the fetal outcomes such as congenital malformations among women with diabetes. However, infertility also impacts how women deal with everyday life after the diagnosis, especially in a country like

Pakistan, with high conservatism and lack of support for the infertile couple. Even if a woman is able to conceive, as such in the cases of secondary infertility, the reproductive phase of a women with diabetes is considerably shorter as compared to the one with no diabetes which in turn causes crucial issues in conceiving and carrying the baby.

Conclusion

This research was conducted to assess the relationship between metabolic dysfunctionalities of women and their infertility. Through quantitative analysis of the structured survey conducted on 90 women in three hospitals in Sindh, Pakistan, the study revealed that a total of 43 out of 90 women had metabolic irregularities, which varied from each other. Variation of the individual diagnosis showed that polycystic ovary syndrome was associated with 62% of infertile women, meanwhile, diabetes, malnutrition, and obesity were associated with 48%, 44% and 30% of women respectively. In conclusion, this study found significant support for the initial assertion that infertile women are more vulnerable to metabolic and ovary disorders. However, further research is required to decipher exact anatomical

relationship between these conditions and female infertility.

Future Implications

This study attempted to bridge the knowledge gap regarding female infertility and its vulnerability to other metabolic disorders. For this, the research contributed statistically in the case of Sindh, Pakistan. However, in order to establish a

thorough and broad-based conclusion, future researchers will have to utilise this study to further decipher into anatomical and genetic component of these conditions and their relations with women's infertility. Research is also required on how these conditions influence hormonal activities of women.

References

- Agarwal, A., Mulgund, A., Hamada, A. and Chyatte, M.R., 2015. A unique view on male infertility around the globe. *Reproductive biology and endocrinology*, 13(1), pp.1-9.
- Bajpai, N., 2015. *Marketing Research*. Pearson Education India.
- Basias, N. and Pollalis, Y., 2018. Quantitative and qualitative research in business & management. *International Journal of Qualitative Studies in Education*, 30(9), pp.832-848.
- Boivin, J. and Gameiro, S., 2015. Evolution of psychology and counseling in infertility. *Fertility and sterility*, 104(2), pp.251-259.
- Business and Economics Research, 7, pp.91-105.
- Creswell, J.W. and Creswell, J.D., 2017. *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
- Fletcher, A.J., 2017. Applying critical realism in qualitative research: methodology meets method. *International journal of social research methodology*, 20(2), pp.181-194.
- Fu, X., Song, A., Zhou, Y., Ma, X., Jiao, J., Yang, M. and Zhu, S., 2014. Association of regional body fat with metabolic risks in Chinese women. *Public health nutrition*, 17(10), pp.2316-2324.
- Gabriel, Y., 2015. Reflexivity and beyond—a plea for imagination in qualitative research methodology. *Qualitative Research in Organizations and Management: An International Journal*.
- Inhorn, M.C. and Patrizio, P., 2015. Infertility around the globe: new thinking on gender, reproductive technologies and global movements in the 21st century. *Human reproduction update*, 21(4), pp.411-426.
- Jonasson, J.M., Brismar, K., Sparén, P., Lambe, M., Nyrén, O., Östenson, C.G. and Ye, W., 2007. Fertility in women with type 1 diabetes: a population-based cohort study in Sweden. *Diabetes care*, 30(9), pp.2271-2276.
- Lewis, S., 2015. Qualitative inquiry and research design: Choosing among five approaches. *Health promotion practice*, 16(4), pp.473-475.
- Lin, Y.H., Chen, K.J., Peng, Y.S., Chen, P.C. and Yang, Y.H., 2018. Type 1 diabetes impairs female fertility even before it is diagnosed. *Diabetes research and clinical practice*, 143, pp.151-158.
- Livshits, A. and Seidman, D.S., 2009. Fertility issues in women with diabetes. *Women's Health*, 5(6), pp.701-707.
- Moen, T., 2006. Reflections on the narrative research approach. *International Journal of Qualitative Methods*, 5(4), pp.56-69.
- Ørngreen, R. and Levinsen, K., 2017. Workshops as a Research Methodology. *Electronic Journal of E-learning*, 15(1), pp.70-81.
- technology: Justifying a suitable research methodology. *Review of Integrative*

- Tobias, D.K., Gaskins, A.J., Missmer, S.A., Hu, F.B., Manson, J.E., Louis, G.M.B., Zhang, C. and Chavarro, J.E., 2015. History of infertility and risk of type 2 diabetes mellitus: a prospective cohort study. *Diabetologia*, 58(4), pp.707-715.
- Tobias, D.K., Gaskins, A.J., Missmer, S.A., Hu, F.B., Manson, J.E., Louis, G.M.B., Zhang, C. and Chavarro, J.E., 2015. History of infertility and risk of type 2 diabetes mellitus: a prospective cohort study. *Diabetologia*, 58(4), pp.707-715.
- Ulmer, J.B., 2017. Posthumanism as research methodology: Inquiry in the Anthropocene.
- Wang, H., Wang, Z., Meng, J., Wang, X., Liu, L. and Chen, B., 2017. History of infertility relates to increased risk of gestational diabetes mellitus: a meta-analysis. *International Journal of Clinical & Experimental Medicine*, 10(2).
- Zalaghi, H. and Khazaei, M., 2016. The role of deductive and inductive reasoning in accounting research and standard setting. *Asian Journal of Finance & Accounting*, 8(1), pp.23-37.

