The Study Of Dermatoglyphics Pattern In Females With Primary Infertility

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KEYWORDS

Dermatoglyphics, Pattern In Females

ABSTRACT

Background: Dermatoglyphics, the study of fingerprint ridge patterns, has been recognized for its potential in reflecting genetic and developmental variations. Primary infertility, defined as the inability to conceive after a year of regular, unprotected intercourse, is influenced by genetic, hormonal, and environmental factors. This study aims to investigate dermatoglyphic patterns in females with primary infertility to explore possible correlations between these patterns and infertility, providing insights for early diagnosis and management.
Objective: The primary objective of this protocol is to systematically analyze dermatoglyphic patterns in females with primary infertility and compare them with those of fertile females. The study seeks to identify specific fingerprint characteristics that may serve as non-invasive markers for primary infertility.
Methodology: This cross-sectional study will include two groups: females diagnosed with primary infertility and age-matched fertile controls. Dermatoglyphic data will be collected using the ink method, and the following parameters will be analyzed: total ridge count (TRC), patterns of arches, loops, and whorls, and other key qualitative features. Statistical analysis will be performed to evaluate significant differences between the two groups.
Expected outcome: The study is expected to reveal distinct dermatoglyphic patterns in females with primary infertility compared to fertile females. Identifying such patterns may provide valuable markers for assessing genetic predispositions and could potentially assist in early diagnosis and personalized treatment strategies for infertility.
Conclusion: This protocol outlines a method for studying the potential role of dermatoglyphic patterns in primary infertility, proposing a non-invasive, cost-effective diagnostic approach. Further research may help in establishing dermatoglyphics as a supplementary tool in infertility assessment and managemen.

1. Introduction

Dermatoglyphics, the scientific study of epidermal ridge patterns on fingers, palms, and soles, has long been used as a tool for medical research due to its genetic underpinnings. Dermatoglyphic traits are fully developed by the 13th to 21st week of intrauterine life, making them a stable marker throughout an individual's lifetime. They have been used as indicators in the diagnosis of various genetic disorders, including chromosomal abnormalities and conditions linked to embryonic development (1).

Infertility, affecting approximately 10-15% of couples globally, is a major public health issue, with primary infertility being defined as the inability to conceive after one year of unprotected intercourse without any previous pregnancies (2,3). In females, primary infertility may arise from a multitude of causes, including hormonal imbalances, ovulatory dysfunction, tubal factors, and other undiagnosed genetic influences (4). Identifying subtle genetic markers for infertility remains an area of ongoing research, as conventional diagnostic tools sometimes fail to provide a clear understanding of the underlying causes (5).

Recent studies have indicated a potential association between dermatoglyphic patterns and infertility, specifically primary infertility in females (6). Dermatoglyphics, being a genetically determined characteristic, may reflect anomalies present during fetal development, particularly those associated with reproductive system formation (7). It has been hypothesized that certain fingerprint patterns, such as the presence of arches, loops, or whorls, could be linked to specific reproductive disorders, including polycystic ovary syndrome (PCOS) and endometriosis, both of which are significant contributors to

infertility (8,9).

Furthermore, dermatoglyphic analysis offers a non-invasive, cost-effective diagnostic tool that can aid in early detection of individuals at risk for primary infertility (10). By examining the correlation between dermatoglyphic patterns and primary infertility, researchers aim to provide an additional layer of understanding regarding genetic predispositions, thus enabling more tailored therapeutic interventions (11,12).

Literature Review:

Studies have investigated the relationship between dermatoglyphics patterns and reproductive disorders in females. The word dermatoglyphics was introduced by Sir Francis Galton, a cousin of Charles Darwin and one of the most innovative scientists of his day, in 1892. Fingerprint identification has been practiced for many hundreds of years by Dr. Harold Cummins and given the name Dermatoglyphics (13). Dermatoglyphics patterns can appear different in a variety of conditions (14). Urogenital abnormalities, genital tract infections, varicocele, endocrinal problems, genetic diseases, and immunological factors are the causes of infertility that affect both male and females (15). Other factors for infertility are the anovulatory cycles, tubal block and blockage of the vas deferens leading to the cessation of ova and sperm cells, male sperm deficiency, and male and female age (16). The study of dermatoglyphic patterns in male infertility is more where, whereas the study on dermatoglyphics in females with primary infertility is significantly less.

J. Dare et al. carried out on 53 cases of primary infertile females at the Nisa Premier Hospital, in the district of Jabi, in Abuja, Nigeria, who reported specific traits, i.e., higher incidence of Arches, Spiral and Elliptical Whorls, decreased FRC, (Finger ridge count), decreased TFRC(Total Finger Ridge Count), and increase in 2D:4D (17). Hence, the studies of dermatoglyphics in male infertility are abundant in the literature; however, there is only one piece of literature by J. Dare, which reveals an association between specific dermatoglyphics patterns and primary infertility in females.

Research Gap

Only one study specifically shows the association between dermatoglyphics patterns and primary infertility in females by J. Dare with small sample sized study with very less cases of primary infertility (i.e. 53) compare to control (i.e. 169).

Present study focus on dermatoglyphics pattern and its association between primary infertile females with larger sample size (i.e.400 = 200(case) + 200 (control).

Based on the review of the prior research, there is a population gap. Some of these sub-populations have been unexplored and under-researched. The study of dermatoglyphics pattern in primary infertile females appear to be important and worthy of investigation in the context of primary infertile females. The study of dermatoglyphics pattern of the larger sample size of primary infertile females is important because result of this study can be used for early screening of the primary infertile females intern can plan early intervention. Furthermore, previous research has focused primarily on the population of infertile females (both primary and secondary). Very little research has been done on dermatoglyphics pattern in females with primary infertile.

Research Question

- Whether such association stands true in the Indian population in respect of primary infertile females?
- Whether is it used on utility for screening tools in Indian population?

Hypothesis

Females with primary infertility will have different dermatoglyphics patterns, including higher ridge counts and fingerprint patterns, compared to fertile controls.

Aim: To study the correlation between dermatoglyphics patterns and primary infertility in females.

Objectives

The objectives of this study are to:

1. To study the dermatoglyphics pattern in fertile females.
2. To study the dermatoglyphics pattern in females with primary infertility.
3. To study the association of the dermatoglyphics pattern and primary infertility in females.

2. Methodology

Study design

A case-control study design would be appropriate to investigate the differences in dermatoglyphics patterns between females with primary infertility and fertile controls.

Sample size: 200 cases (primary infertile females) and 200 control (fertile females).

Participants

Participants will be recruited from Wardha Test Tube Baby Centre, Obstetrics and Gynecology Department, AVBRH, Sawangi (Meghe) Wardha.

Cases should be females who have been diagnosed with primary infertility. Controls will be females who have had at least one successful pregnancy.

Patient (Case) selection

Inclusion Criteria:

1. Females with primary infertility
2. Females with first IVF pregnancy
3. No history of infections or diseases that can result primary infertility
4. Be between the ages of 20 and 35.

Exclusion criteria:

1. Females who experience secondary infertility.
2. Couples having less than minimum one year of regular unprotected sexual intercourse.
3. Females with congenital abnormalities in the control and study groups.
4. Females in the control and research groups with a hereditary or familial disease.
5. Females with PCOS, endometritis, and any other anomalies.

Control selection

Inclusion Criteria:

1. Females with first successive pregnancy without delay.
2. Healthy couples.
3. Females without having any abnormality in uterus, ovary and fallopian tube.
4. Be between the ages of 20 and 35.

Exclusion criteria:

1. Females who did not conceiving second pregnancy.
2. Delayed fertility.

3. Other health disorder which can be correlated with infertility.

Data collection

Data will be collected regarding the age, duration of married life, gravida, and treatment history of both partners. Parameters to be studied will be fingerprint patterns, i.e., Arches, Loops and Whorls, TFRC, AFRC, and palm prints, including a – bridge count, angles of the palm: and, dat, and at angles. Patients will be instructed to thoroughly wash both their hands with soap and water to remove any oil or dirt. The impression of distal phalanges of both hands will be taken on paper by inking and pressing them against paper placed on a hard surface; then, fingerprint patterns will be examined and noted down. Palm prints of both hands will be taken on paper by inking both palms and pressing them against paper placed on the flat hard surface. An angle will be used in interpreting the position of 'T' triradius. Lines are drawn from the digital triradius 'A' and 'D' to the axial triradius 'T' form 'and' angle. After this, TFRC, i.e., Total Finger Ridge Count, and AFRC, i.e., Absolute Finger Ridge Count, will be studied.

Data analysis

Data will be analyzed statistically to compare dermatoglyphics patterns between cases and controls (fertile females). The mean ridge count, pattern intensity index, and pattern types will be compared using t-tests or Mann-Whitney U tests, as appropriate. Logistic regression analysis will be used to determine if dermatoglyphics patterns can predict primary infertility, adjusting for potential confounding factors such as age, BMI, and smoking status.

Sample size calculation

- On Proportional Basis-

$$N = \frac{\left(Z_{(\alpha/2)}+Z_{\beta}\right)^2 (P_1(1-P_1)+(P_2(1-P_2)\,)\text{^}2}{(P2-P1)^2}$$

- $Z_{\alpha/2} = at\ 95\ \%\ \ (CI) = 1.96\ at\ one\ side\ 5\ \%\ error$
- Represents the desired level of statistical significance
- $Z_{\beta} = 0.84$ Represents the desired power = 0.84 for 80%
- $N = \ \ Minimum\ samples\ required\ for\ each\ group$
- Primary Outcome – Whorl Proportion %
- P_1 = Whorl Proportion % in fertile group = 15.8 % (As per reference article)
- P_2 = Whorl Proportion % in infertile group = 27.5 % (As per reference article)
- n= $(1.96+ 0.84)^2$ (0.158)* (1- 0.158)+ (0.275)* (1-0.275)^2/ (0.117)^2= 194 per group.
- Considering 10% drop out = 20

Minimum sample size required =194 per group

- Required sample size 214 per group
- Total sample size required = 428

Expected Results:

The study is expected to provide insights into the potential role of dermatoglyphics patterns as a diagnostic tool for primary infertility in females. If significant differences in dermatoglyphics patterns are found between cases and controls, it will help to develop new screening tools or diagnostic tests for primary infertility.

Clinical implications:

The study's findings could be applied to clinical practice by helping healthcare professionals identify

individuals at higher risk for primary infertility based on their dermatoglyphics patterns. The present study could help in early diagnosis and treatment, potentially improving patient outcomes.

Further research:

The study's findings could also guide further research into the mechanisms behind the association between dermatoglyphics patterns and primary infertility in females.

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