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Guide: Dr. Vickram Project - I

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BME

Analysis and Comparison of Zinc Microelement Concentration present in human Seminal plasma of asthenospermia and normospermia conditions using atomic absorption spectroscopy for male infertility diagnosis related to motility issues.

1. Definition:
Research is about Clinical study for Diagnosis of Male infertility with Motility issues based on Zn Microelement Concentration in Human Seminal plasma (Fallah, et; al 2018, journal of reproduction & fertility, 19(2), 89.)

2. Importance

Infertility Diagnosis is utmost necessary as 40% of couples in world is facing infertility issues (Kumar, et; al 2016, ^{indian} journal of Obstetrics & Gynecology research).

3. Applications

- Andrology Department, in reproductive medicine (Harchegani, et; al 2019, international journal of fertility & sterility)
- Biomolecules identification for male infertility (Zhao, et; al, 2016, Systematic review and metaanalysis Scientific reports).

Paragraph 2:

1. Total number of articles - google scholar - 347
pubmed - 40

2. Most cited

- Zinc level in seminal plasma of asthenospermia male is lower than normospermia - Zhao, et; al, 2016, Systematic review and metaanalysis Scientific report

- 2, Zinc has regulative role in progress of Capacitation and acrosome reaction (Fallah et; al 2018, journal of reproduction & fertility).
- 3 changes in Zinc concentration is related to sperm quality as they are involved in antioxidant balance (Nenkova, G, et; al 2017, Balkan medical journal)
- iv, The quality of sperm is negatively impacted by oxidative stress (Harchegani et; al 2019, international journal of fertility & sterility)
- 3, The Best one out of 4 is Zinc has regulative role in progress of Capacitation and acrosome reaction (Fallah et; al 2018, journal of reproduction & fertility).

Paragraph 3

- 1, There is no conclusive clinical comparison between zinc concentration in asthenospermia & normospermia condition.
- 2, Expertise in zinc and it's impact, we have four (4) publications related to this
- 3, Aim: To compare zinc Microelement concentration between asthenospermia & normospermia conditions for finding clinical significance.

Asuck

Title 1 SSE/21/19/059-1

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Analysis and Comparison of Zinc Microelement

Concentration present in human seminal plasma
of asthenospermia and normospermia conditions using
atomic absorption spectroscopy for male infertility
diagnosis related to mobility issues ✓

Study Setting :- This study conducted at Andrology
lab Milan Fertility Center, Bangalore
& Biochemistry lab in Saveetha School
of Engineering ✓

Ethical approval :- Approval done for working with
Semen samples (MFITH/2019) ✓

No. of groups :- 2 Groups ✓

Group 1: Study Group ✓

→ Infertile Men (Asthenospermia)

Group 2: Control group ✓

→ Fertile Men (Normospermia) ✓

Sample Size :- Group 1:- 75 ✓

Group 2:- 75 ✓

Pre test power :-

Sample Size

clinical.com ✓

Alpha Error -

threshold 0.05

95% ✓

Confidence
interval

power 80% ✓

Enrollment ratio - 1

(Fallah, et, al 2018,
journal of reproduction
& fertility, 19(25, 69). ✓

Sample preparation:

Group 1: Study Group

- Sample Collection: By following Standard Protocol of WHO (2010) Andrology lab at
- Semen Analysis: By Centrifugation which separates (CASA) the seminal plasma (Luna samania et. al 2018)
- ✓ Checked for quantification of Zinc concentration detected by flame atomic absorption spectroscopy

Group 2: Control group - Normospermia

- Sample Collection: By following standard of WHO protocol (2010) done at Andrology lab Bangalore.
- ✓
- Semen Analysis: By Centrifugation which separates the seminal plasma (CASA) (Luna samania et. al 2018)
- Checked for quantification of Zinc concentration detected by flame atomic absorption spectroscopy

Testing Setup:

CASA - German MADE, MTA 50 CSA

Atomic Absorption Spectroscopy, flame photometry
L A. KRUSSE optonic GmbH.

Labtronics Flame photometer, Model LT-65.

Testing procedure:

1. Semen Collection: plastic container

2. Semen Analysis: pH, Volume, sperm mobility, morphology, sperm concentration, Rapid Motility.

3. Zinc Concentration Analysis is done using atomic absorption spectroscopy. and Calibration is done. which predicts the concentration of Zinc in the sample (Luna Samania et. al 2018)

Data Collection:

Volume :- ml

pH :- -

Sperm mobility - %

Sperm morphology - %

Sperm concentration - millions/ml

Zinc Concentration - mg/ml

Statistical software :- Graphpad prism, version 10.1, IBM, SPSS, Version 2.1

Independent variable :- Volume, mobility, morphology, Zinc concentration.

Analysis Done :- Mean, standard deviation for control and T test, Correlation, Standard group.

Results and Discussion

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Table - I

Comparison of Zinc Concentration Variation in Normospermia Men and asthenospermia Men by comparing the concentration of Zinc in Fertile group and infertile group which gives the Mean \pm standard error Mean.

Table - II

This table represent that Independent sample T-test which shows the significance in which the zinc concentration ($P < 0.3$) is found to be insignificant and this is found with statistical significance when compared for fertile and infertile Men

Table - III

This table represents the Mean \pm std. Deviation for Zn conc, Sperm conc, Motility, Morphology, Volume in Normospermia Men

Table - 4

This table represents the Correlation which is done in comparison with Zn Concentration in Normospermia Men with 4 parameters. Such as Sperm conc (0.006), motility (0.19), Morphology (-0.06), Volume (0.10). Correlation is significant at 0.05 level

Bar chart

This Bar Chart represents the comparison of Zinc concentration in Normospermia and asthenospermia Men. It shows that the Zinc concentration is less in asthenospermia Men and more in Normospermia Men.

Discussion

Result Summary:

- In this study we observed that the Zinc concentration in Normospermia Men is higher and in asthenospermia Men it is significantly low.
 - We found that Zinc concentration plays a role in fertility. The Zinc concentration in Normospermia Men (2.2 mg/dl) is higher than the Zinc concentration in asthenospermia Men (0.5 mg/dl).
- 2, Literature with similar findings
- Zinc plays a major role in fertility of men (Zhao, et al; 2014, ~~Journal of~~ Systematic review and Metaanalysis report).
 - Zinc concⁿ in Normospermia males (2.84 mg/dl) is higher than asthenospermia males (0.24 mg/dl) (Vickram, A. S, et al, 2016, Syst Biol Reprod Med).
- 3, Literature with opposing findings
- Zinc is not a necessary factor to male fertility in determining (Zhao et al 2016, systematic review and Metaanalysis report).

4, According to My findings by taking ~~for~~ different Parameters. It is found that the levels of Zinc is higher in fertile Males (2.5 ^{mg/ml}) whereas it is low in asthenospermia Males (0.90 ^{mg/ml}). Correlation is done. ~~with~~ with respect to ~~other~~ ^{other} semen Parameters ~~concentration~~

limitation

Atomic spectroscopy has less sensitivity and relatively large sample quantities are required

future scope

Zinc can be used as Mandatory test for preparation of Semen analysis report

Conclusion

Zinc Concentration in Normospermia Males is higher than asthenospermia Males.