

## ORIGINAL ARTICLE

**STUDY OF SEMINAL ACID PHOSPHATASE AND ALKALINE PHOSPHATASE LEVEL IN RELATION TO SPERM COUNT IN TEACHING HOSPITAL**Nayak Jitendra<sup>1</sup>, Patel Piyush<sup>2</sup>, Patel Sangeeta<sup>3</sup>, Chavda Bipin<sup>4</sup>**Author's Affiliations:** <sup>1</sup>Consultant Pathologist; Ahmedabad, <sup>2</sup>Associate Professor; <sup>3</sup>Assistant Professor, Department of Microbiology; <sup>4</sup>Assistant Professor, Dept of Pathology, GMERS Medical College, Gandhinagar, Gujarat.**Correspondence:** Dr.Piyush Ashokbhai Patel Email: piyush\_doctor@yahoo.co.in**ABSTRACT**

**Background:** There are multiple diagnostic tests and procedures are available for diagnosis of infertility but semen analysis still is considered as most valuable diagnostic test for investigation of infertility. It is equally important that the semen analysis should be performed by experienced and expert person by proper technique. Biochemical analysis seminal fluid provide valuable information regarding functional status of main and accessory genital organs. The acid phosphatase and alkaline phosphatase level in seminal fluid is higher than blood but its relation to infertility is still unidentified and its results are conflicting. So this study is carried out to know any relationship between seminal acid phosphatase and alkaline phosphatase level to sperm counts.

**Objective:** This study is carried out to know any relationship between seminal acid phosphatase and alkaline phosphatase level to sperm counts.

**Materials and Methods:** This study was carried out at Department of Pathology of Shree M. P. Shah Medical College, Jamnagar, Gujarat, India during the one and half year period from 1<sup>st</sup> April 2004 to 31<sup>st</sup> October 2005. 100 cases of male infertility patients were enrolled as study group visiting OPD, G. G. Hospital, Jamnagar, Gujarat, India. Sperm count is done by improved Neubauer counting chamber. Seminal acid phosphatase and alkaline phosphatase level is determined by method suggested by King and King.

**Results & conclusion:** Out of 100 patients most of the patient is in 26-35 years of age group. There is highest amount of acid phosphatase levels in azoospermic patients while lowest in patient with highest sperm counts. There is no any significant relationship between alkaline phosphatase level with sperm count while there is inverse relationship between acid phosphatase levels with sperm count.

**Keywords:** Semen analysis, Acid Phosphatase, Alkaline Phosphatase

**INTRODUCTION**

Today there are multiple diagnostic tools available for diagnosis of infertility, but semen analysis still remains the most basic and simple screening test for the evaluation of infertility.<sup>1</sup> In 1886 the importance of presence of spermatozoa for fertilization described by Sims who performed post-coital examination of fluid present in vagina and endocervix. He stated that spermatozoa has to be present in endocervix mucus for conception to occur. Wiesman stated that a semen analysis was not complete unless the volume, motility, concentration and morphology were determined. This was further supported by the work of Hotchkiss in

1945.<sup>1</sup> Semen analysis has and will be the most important factor in the initial investigation of male infertility. It is therefore extremely important that a Semen analysis be performed skillfully and properly.<sup>1</sup>

The biochemical analysis of the seminal fluid would provide valuable information on the function of the accessory genital glands under normal and pathologic conditions. The main portion of human semen originates from testes, seminal vesicles, and prostate. Testes forms spermatozoa, seminal vesicles forms fructose and prostate forms phosphatase enzyme.

Alkaline phosphatase and acid phosphatases are specific enzymes which react on compounds containing monophosphate or diphosphate group. These enzymes are found in a wide variety of animal tissues. In females, their activity varies with the phase of menstrual cycle and in cervical mucous, it is influenced by progesterone. <sup>2</sup> Phosphatases are enzyme which catalysed the splitting of phosphoric acid from certain monophosphoric esters. <sup>3</sup> The role of phosphatase in the metabolism related to the maturation of sperm in the epididymis was described by Bovedek and Glover in 1970. <sup>4</sup>

Gutmen and Gutmen <sup>5</sup> observed high level of acid phosphatase in the human seminal fluid. The main source of acid phosphatase production is prostrate. This acid phosphatase is increasing in prostatic carcinoma thought to be androgenic dependent. <sup>3,6</sup> Moon and Bunge <sup>7</sup> observed high level of alkaline phosphatase in the human seminal fluid than blood, but the factors influencing its concentration are still unidentified. They also observed that studies available about the relation of activity of alkaline and acid phosphatase to the sperm count and motility were conflicting. Analysis of acid phosphatase level is most convenient chemical indicator of functional status of prostate. <sup>8</sup>

## AIMS & OBJECTIVES

This study was carried out to evaluate male infertility by semen analysis and to observe any relationship between Semen alkaline phosphatase and acid phosphatase with sperm motility.

## MATERIALS AND METHODS

The present study was carried out at Department of Pathology of Shree M. P. Shah Medical College, Jamnagar, Gujarat, India during the one and half year period from 1<sup>st</sup> April 2004 to 31<sup>st</sup> October 2005. 100 cases of male infertility patients were enrolled as study group visiting OPD, G. G. Hospital, Jamnagar, Gujarat India. All the patients were between 21 to 45 years of age.

Semen sample were collected in clean, dry, wide mouth, biologically inert plastic container at OPD laboratory side room by masturbation after 3 days of abstinence of coitus. Volume and viscosity, liquefaction time of seminal fluid were noted. Sperm count is done by improved Neubauer counting chamber. Sperm motility were assessed by slide technique by using fresh coverslip preparation observing minimum 200 sperm. Motility assessment done in duplicate and average is taken for

assessing motility. Field stained slide preparation of undiluted semen is used to assess morphology. Semen alkaline phosphatase and acid phosphatase were measured by the method given by King and King 1954.

The patients who do not show any spermatozoa considered azoospermic. Preliminary details of the patients like age, medical history and the details like patients name, age, medical history, sperm count, sperm motility, acid phosphatase, alkaline phosphatase level were recorded and noted in specially formed Performa. Obtained Observations and results are tabulated, analysed and compared with the similar studies by the other authors.

## RESULTS

**Table 1: Age group wise distribution of patients (n=100)**

Age group (years)	No. (%)
20-25	6 (6.0)
26-30	42 (42.0)
31-35	38 (38.0)
36-40	12 (12.0)
41-45	2 (2.0)

Age group wise distribution of male infertility patients under investigation is shown in table no 1. It can be seen that most patients are in the age groups of 26-30 years followed by 31-35 years, 36-40 years and 41-45 years comprise of 42%, 38%, 12%, 6%, 2% respectively.

**Table 2: Sperm count of patients (n=100)**

Sperm count (million/ml)	No. (%)
Azoospermia	11 (11.0)
1-10	9 (9.0)
11-20	10 (10.0)
21-30	5 (5.0)
31-40	11 (11.0)
41-50	20 (20.0)
51-60	14 (14.0)
61-70	9 (9.0)
71-80	7 (7.0)
Above 80	4 (4.0)

Table 2 shows out of 100 male patients 11% were azoospermic while 9% shows 1-10, 10% shows 11-20, 5% shows 21-30, 11% shows 31-40, 20% shows 41-50, 14% shows 51-60, 9% shows 61-70, 7% shows 71-80, 4% shows above 80 million/ml sperm count respectively.

**Table 3: Relation of sperm count with alkaline phosphatase**

Sperm count (million/ml)	Cases	Alkaline Phosphatase (KAU/ml) (Mean ± 2SD)
Azoospermia	11	0.49±0.016
1-10	9	0.48±0.019
11-20	10	0.40±0.017
21-30	5	0.46±0.017
31-40	11	0.43±0.022
41-50	20	0.48±0.021
51-60	14	0.51±0.016
61-70	9	0.53±0.019
71-80	7	0.48±0.010
Above 80	4	0.46±0.014

Relationship between sperm counts and alkaline phosphatase is shown in table no.3.it can be seen from table no. 3 that there is no any significant relationship between sperm counts and alkaline phosphatase.

**Table 4: Relation of sperm count with acid phosphatase**

Sperm count (million/ml)	Cases	Acid phosphatase (KAU/ml)(Mean ± 2SD)
Azoospermia	11	9181.81±252.26
1-10	9	8277.77±263.52
11-20	10	7650.00±241.52
21-30	5	6800.00±273.86
31-40	11	6181.81±337.10
41-50	20	5200.00±251.31
51-60	14	4321.42±372.47
61-70	9	3944.44±390.87
71-80	7	3714.28±267.26
Above 80	4	3375.00±250.00

It can be seen from table no 4 that in azoospermic patient the acid phosphatase concentration level is highest and those patient with sperm counts above 80 million/ml shows least of acid phosphatase concentration level.the table no. 4 further shows that as the sperm count increase, the acid phosphatase concentration level decreases and vice versa.

**DISCUSSION**

Table 1 shows age group wise distribution of patients with infertility. it shows there is highest number of patients is in 26 – 35 years of age group and least number of patients with 41-45 years of age group. This is because the legal age of marriage for men in india is 22 years.the couple does not have child after 5 to 7 years of active marriage then they will go for medical advice from qualified doctor.Patients after 40 years are least in number be-

cause by that time they have already taken the medical or surgical treatment or they have accepted the infertility. Sperm count of patients is shown in table no 2. Most of the patients shows 30 to 60 million /ml sperm counts while 11% patients is azoospermic.

Table no.3 shows relationship between of sperm count and alkaline phosphatase. it shows there is no any significant relationship between between sperm counts and alkaline phosphatase.This finding supported by other studies done by , patel A. et al<sup>9</sup>, Samnel et al<sup>10</sup> and V.S. Jather et al<sup>11</sup> and Lewin-L M et al<sup>12</sup>.

Patel A. et al<sup>9</sup> did not observe significant correlation between alkaline phosphatase level and sperm count in their study on 100 infertile patient .Samnel et al<sup>10</sup> did not observe significant correlation between alkaline phosphatase level and sperm count in their study on fertile, subfertile and vasectomised azoospermic individuals. V.S. Jather et al<sup>11</sup> studied 60 normal adults and compared with 60 obligospermic and 24 azoospermic Indian subjects. They also did not show any relationship between seminal alkaline phosphatase level and sperm count as show in table 8.Lewin-L M et al<sup>12</sup> studied total alkaline phosphatase activity in 30 samples of human semen .They found no significant relation between the enzyme activity and the sperm count, and semen volume.This finding is in constrast with the finding of the study done by R.P. Das et al<sup>13</sup> They found positive correlation of seminal alkaline phosphatase level with sperm count.

Table no 4 shows that as the sperm count increase, the acid phosphatase concentration level decreases and vice versa. So there is inverse relationship between sperm counts and acid phosphatase.Our findings were compared by other studies done by different authors. Present study suggest there is inverse relationship between between sperm counts and acid phosphatase. The finding is same as the other studies done in india and abroad by, patel A. et al<sup>9</sup>, V.S. Jathar et al<sup>11</sup>, Upadhaya M. et al<sup>14</sup> and Samnel et al<sup>10</sup> .

Patel A. et al <sup>9</sup> observe the activity of acid phosphatase showed progressive rise with decrease in the sperm concentration.Samnel et al<sup>10</sup> observed highest level of seminal acid phosphatase in vasectomised azoospermic patients. They showed reverse relationship of seminal acid phosphatase activity against sperm concentration.

V.S. Jathar et al<sup>11</sup> had found that the activity of seminal Acid Phosphatase showed a fall as the sperm count increased. As compared to normal (

fertile group), significantly higher mean values of seminal acid phosphatase activity were observed in oligospermic (subfertile group) and azoospermic group. Upadhaya M. et al<sup>14</sup> studied 176 males attending infertility clinic and 88 controls awaiting elective vasectomy. They also found that the activity of seminal acid phosphatase was higher in the former group. Our study finding is in contrast with the findings of study done by Vaishwanar et al<sup>15</sup>. They did not find any significant correlation of seminal acid phosphatase with concentration of sperm. No significant difference in the activities of seminal acid phosphatase for azoospermic and non-azoospermic men was observed by them.

## CONCLUSION

Semen analysis in all patients shows there is significant amount of acid phosphatase and alkaline phosphatase in human seminal fluid. The concentration of acid phosphatase and alkaline phosphatase is significantly variable in different individual. There is inverse relationship between acid phosphatase concentration level and sperm counts. There is no any significant relationship between alkaline phosphatase concentration level and sperm counts

## REFERENCES

1. Anibal a. Acosta and thinnus s kruner : human spermatozoa in assisted reproduction second edition page no 53-71 ,1996.
2. Gregoire, A.T., O. Kandil and G. Beyer. The acid and alkaline phosphatase activity in human cervical mucous of females using either a coil or combined therapy. *Fertil. Steril.* 1972, 23 : 15-17
3. Eliasson, R. Biochemical analysis of human semen in the study of physiology and patho-physiology of the accessory genital glands. *Fertil. Steril* 1968., 19(3) : 345-349.
4. Bovedek S. and Glover T .D. alkaline phosphatase in the cytoplasmic droplet of rabbit spermatozoa. *J reproduct and fertility* 1970: 22; 371-375
5. Gutmen C B and Gutmen A B quantitative relation of prostatic component of acid phosphatase of human seminal fluid. *Endocrinology* 1941. 28; 115.
6. Yam, L.T. Clinical significance of the human acid phosphatase, *Am.J.Med* 1974., 56 : 604-615.
7. Moon, K.H. and R.G. Bunge. Observation on the biochemistry of human semen Alkaline phosphatase, *Fertil. Steril.* 1968, 19 : 766-769.
8. Vaclav insler and Bruno lunenfield: infertility: men and women; churchil livingstone 1993; .285-315.
9. Patel A, Dixit S ,Patel M,Shah P: Study Of Semen Acid And Alkaline Phosphatase In Relation To Sperm Count And Motility. *SEAJCRR* 2013: JAN-FEB 2(1); 112-121.
10. Sammel Nurm, Ines Musacchio, J Fanne A, Epstein. : Variations in seminal plasma constituent from fertile, Subfertile and vasectomised azoospermic men. *Fertil. Steril.* 1972 23(5) : 357.
11. V.S. Jathar and Rashmi Hirwe, Shanta Desai and R. S. Satoskar. : Seminal fructose citric acid and phosphatase levels and their relation to the sperm count in man. *Ind. J. Physiol. Pharmac.* 1977: 186-190.
12. Lewin, LM, Golan R., Soffer Y. Kaufman S., Yulzary Y. Zaidman J., Alkaline phosphatase in human semen : An investigation using enzyme inhibition and gel electrophoresis. *Eur. J. of clin. Chem. and clin. Biochem* 1993; 31(12):811-814.
13. R.P. Das, Somnath Roy and A.K. poddar : Relation of phosphatases in human semen to sperm count and motility. *Ind.J.Med.Res.*63(9):1323 -1326, 1975.
14. Upadhaya M. Hibbard B. M, Walker S. M. : Seminal acid phosphatase in relation to fertility. *Acta. Obst. Gynec. Scandinavica.* 1986; 65(1) : 49 -52.
15. Vaishwanar P.S. and Abayankar H. N. : Acid phosphatase and pH in human semen. *Ind. J. Exp. Biol* 1971; 9 : 261.