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Original Research Article

TO COMPARE THE VITREOUS HUMOR FINDINGS WITH THAT OF THE SYNOVIAL FLUID FINDINGS

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Abstract

Background & Methods: The aim of the study is to compare the vitreous humor findings with that of the synovial fluid findings. Sample of vitreous humor was aspirated from both the eyes simultaneously and sample of synovial fluid was aspirated from both the knees simultaneously as early as possible after the entry of the body into mortuary. Second sample was taken from both the eyes and both the knees simultaneously at the time of post-mortem examination. The samples which were turbid and mixed with blood were discarded. The details of the cases were recorded in the proforma attached.

Results: There were 26 cases with time since death within 12 hours which constituted 52%, there were 17 cases with time since death from 12.1 to 24 hours which constituted 34% and 7 cases with time since death more than 24 hours which constituted 14% out of 50 total cases. The sodium and potassium values in right eye vitreous sample 1 and right knee synovial fluid sample 1 with time since death more than 24 hours.

Conclusion: There is also no significant difference between the values of vitreous humor and synovial fluid. The study also concludes that the sodium values are not statistically significant and shows negative correlation with time since death.

Keywords: vitreous, humour, synovial & fluid.
Study Design: Comparative Study.

1. INTRODUCTION

The estimation of post-mortem potassium concentration from body fluids such as Cerebro Spinal Fluid (CSF), aqueous humour, vitreous humour, blood, serum, and synovial fluid has been employed in practice to evaluate times since death (TSD)[1]. Vitreous humor (VH) is a transparent jellylike tissue that fills the eyeball behind the lens, composed of collagen fibres and hyaluronan. VH contains electrolytes such as Na+, K+, Cl-, Ca++, and Mg++, and the average potassium level in VH is about 3.8 mmol/l. Synovial fluid, which lubricates and cushions joints, contains components such as hyaluronic acid, proteinases, collagenases, lubricin, Na+, K+, Ca++, and glucose. TSD estimation from VH and synovial fluid, with studies showing the latter to be the most precise[2].

Furthermore, an attempt was made to know if vitreous humor chemistry can of help in knowing the cause of death in poisoning cases in the immediate, early, and late post-mortem

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period[3]. One important method used to estimate PMI with accuracy during the first 24 hours is to measure the concentration of potassium in bodily fluids such as vitreous humor and synovial fluid. To reduce the errors in the results, cases with injuries to the orbit and knee, aspirations that yielded turbid sample, cases with history of renal disease and any other eye or orbit diseases were carefully excluded from the study[4-5].

2. MATERIAL AND METHODS

This study was carried out on 50 cases at Index Medical College Hospital & Research Centre, Indore for 01 Year which was brought for autopsy. Details of these cases were obtained from the hospital records, records, relatives and friends. Cases whose exact time of death was not known and with previous history of eye or orbital injury or surgery, posterior segment diseases, joint diseases, previous injury or surgery were excluded from the study.

Samples were collected from both vitreous humor and synovial fluid. Sample of vitreous humor was aspirated from both the eyes simultaneously and sample of synovial fluid was aspirated from both the knees simultaneously as early as possible after the entry of the body into mortuary. Second sample was taken from both the eyes and both the knees simultaneously at the time of post-mortem examination. The samples which were turbid and mixed with blood were discarded. The details of the cases were recorded in the proforma attached.

Samples of vitreous humor were collected from the posterior chamber by aspirating gradually and slowly through a puncture 5-6 mm away from the limbus using a sterile 20 gauge needle taking care to avoid tearing of any loose tissue fragments surrounding the vitreous chamber.

3. RESULT

Table No. 1: Gender Distribution

S. No.	Gender Distribution	No. of Cases	Percentage
1	Male	35	70
2	Female	15	30

The study included 100 cases, with 70% males and 30% females, and poisoning cases were the most prevalent.

Table No. 2: Time since death

S. No.	S. No Time since Death (Hours)	No. of Cases	Percentage
1	Within 12 hours	26	52
2	12.1-24 hours	17	34
3	Above 24 hours	07	14

There were 26 cases with time since death within 12 hours which constituted 52%, there were 17 cases with time since death from 12.1 to 24 hours which constituted 34% and 7 cases with time since death more than 24 hours which constituted 14% out of 50 total cases.

Table No. 3: Sodium and Potassium values

S.	S. No Time	Vitreous	Synovial

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No.	since Death (Hours)				
		Sodium	Potassium	Sodium	Potassium
1	31	147.9	7.1	147.9	7.0
2	27	139.4	10.4	139.4	10.6
3	48	131.7	13.9	131.7	12.9
4	102	124.6	16.7	124.6	15.8
5	29	143.2	8.1	143.2	9.6
6	36	133.4	15.4	133.4	13.2
7	28	138.2	7.5	138.2	6.8

This table shows sodium and potassium values in right eye vitreous sample 1 and right knee synovial fluid sample 1 with time since death more than 24 hours.

Table No. 4: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t
	B			
(Constant)	0.742	0.171		4.166
Right K Vitreous humour	0.103	0.023	0.451	4.981

4. DISCUSSION

Vitreous humor and synovial fluid are two body fluids that can be useful in forensic pathology to aid in the determination of the cause and manner of death. Both fluids can provide information about the presence of drugs and alcohol, unknown substances, and the diagnosis of diseases[6]. They can also be used for genomic analysis. Further research could focus on refining the methods for using these fluids to estimate post-mortem interval accurately, detecting specific types of drugs and alcohol, and developing new methods for identifying unknown substances. The potential of these fluids for diagnosing diseases and for genomic analysis could also be explored[7]. There is enough research about VH and SF for post-mortem interval estimation. It is time to explore further areas of research like applying OMICS technologies to cells in these body fluids.

Studying these body fluids can give us some insight into finding auto-markers for different cause of death in future. The role of vitreous calcium and magnesium levels in estimating time since death were studied and found not to be useful in practice. Hence, potassium concentration remains the important tool even now with some researchers even attempting to go further for age and temperature standardisations[8].

The results demonstrate a strong utility of potassium levels of body fluids in estimating post-mortem interval. The time since death and sex distribution of our cases. Several researchers used VH for identifying poisons and drugs responsible for death of the individuals. However, we were successful in only establishing alcohol intoxication using vitreous humor samples. The lack of standardisation of methods used for the purpose could be a reason for not being able to identify other poisonings whereas other researchers achieved this. The increasing post-mortem interval there is a linear rise in potassium levels and fall in sodium levels in both VH and SF. These results are also statistically significant[8]. These results are concordant with previous studies in total. The regression analysis in the study indicate that the values of

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potassium concentration in VH/SF and post-mortem interval correlate with each other and exhibited statistical strength.

5. CONCLUSION

There is also no significant difference between the values of vitreous humor and synovial fluid. The study also concludes that the sodium values are not statistically significant and shows negative correlation with time since death.

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