THINK INDIA JOURNAL

ISSN:0971-1260
Vol-22- Issue-14-December-2019

Forensic use of EDXRF technique to evaluate the metallic Components of Saliva and Urine for Identification of Gender

Dr. Khushali Joshi** * Dr. Thamarai Selvan** ***** Manjugouda R Patil**

*****Representative, Institute of Interdisciplinary Education in Forensic Science, Brazil.

**Forensic Odontologist, Maulana Azad Institution of Dental Science. Delhi.

***Research scholar, Department of Criminology and Forensic science, Karnatak Science College, Dharwad, Karnataka.

ABSTRACT

Biological fluids have been playing a vital role in most of the cases involving the criminal investigation. They are found to be useful as markers of identification. There are many studies in which by DNA analysis the identification of gender is possible but there are very less technique where the identification can be possible by evaluation of metallic component in biological fluids. A study has been undertaken with saliva and urine samples has been analysed without subjecting it to any chemical and biological examinations. But there was a physical examination done with EDXRF. In this study a total of 75 males and 75 females have been considered. From these subjects, the samples has been collected and has been analysed for their metallic components. There was a significant difference noted among the females and males.

KEYWORDS: Gender Determination, Body Fluids, Metallic Components, EDXRF.

1. INTRODUCTION

Biological fluids that has imperative role in forensic sciences. In many criminal cases such as sexual assault, child abuse, physical assault or attempted homicide cases, bite-marks one of the least common evidences collected from such incidents is that of saliva or urine. It may be

ISSN:0971-1260
Vol-22- Issue-14-December-2019

obtained either from the victim or suspect. The Double swab technique is usually used to collect saliva from the skin [1] and urine samples also can be collect with same technique. Jackie Morton et.al(2014) worked on determination of metallic components from body fluids.[2] As metals present in the body fluids are affecting the hormonal profile[3],[4] the gender identification can be establish. Without subjecting the saliva or urine for any chemical or biochemical profiling, there is a scope of getting it done through the assessment of the physical properties such as metallic components as mineral elements are having a great physiological importance it is available and play a vital role in body fluids [5]. By applying the easier and least investigative procedures, there is a scope of assessing the primary characteristics by using EDXRF technique.

2. MATERIALS AND METHODS

The informed consent has been obtained from all the subjects. This study includes non-stimulated salivary and freshly collected urine sample of 75 males and 75 females. The inclusion criteria areof the age groupbetween 18 to 30 years. They are all of normal, both physically and psychologically as well. The influence of various pathological conditions such as the upper respiratory disorders and other ailments of the oropharynx, urinary tract infection or renal stone isexcluded.The subjects having the habits of smoking, alcoholism and tobacco chewing habits alsohave been excluded. The female urine during menstruation are also excluded. The materials required for the analysis of sample are,EDXRFE: -Model: SHIMADZU 7000, SOFTWARE: PCEDX Pro Navy.Samples analysis done with Mylarsheath, sterile cotton, sterile blood collecting plain tube(4ml), sterile disposable syringe (2.5ml), sterile masks and gloves, diethyl ether, distilled water and tissue paper. The saliva is collected by keeping sterile cotton on the parotid and submandibular region for 30 sec to 1 min. The cotton soaks due to the imbibitions of saliva. The saliva soaked cotton is placed in the sterile syringe and squeezed to collect the saliva in the sterile blood collecting plain tube (4ml). Urine samples has collected in sterile Uricol container and collected freshly.This collected samples are loaded on the EDXRF to find out the various metallic component values. The EDXRF is standardized(calibrated) by pure stainless steel block after every 10 samples. Before loading, each sample Mylarshea this cleaned properly

ISSN:0971-1260
Vol-22- Issue-14-December-2019

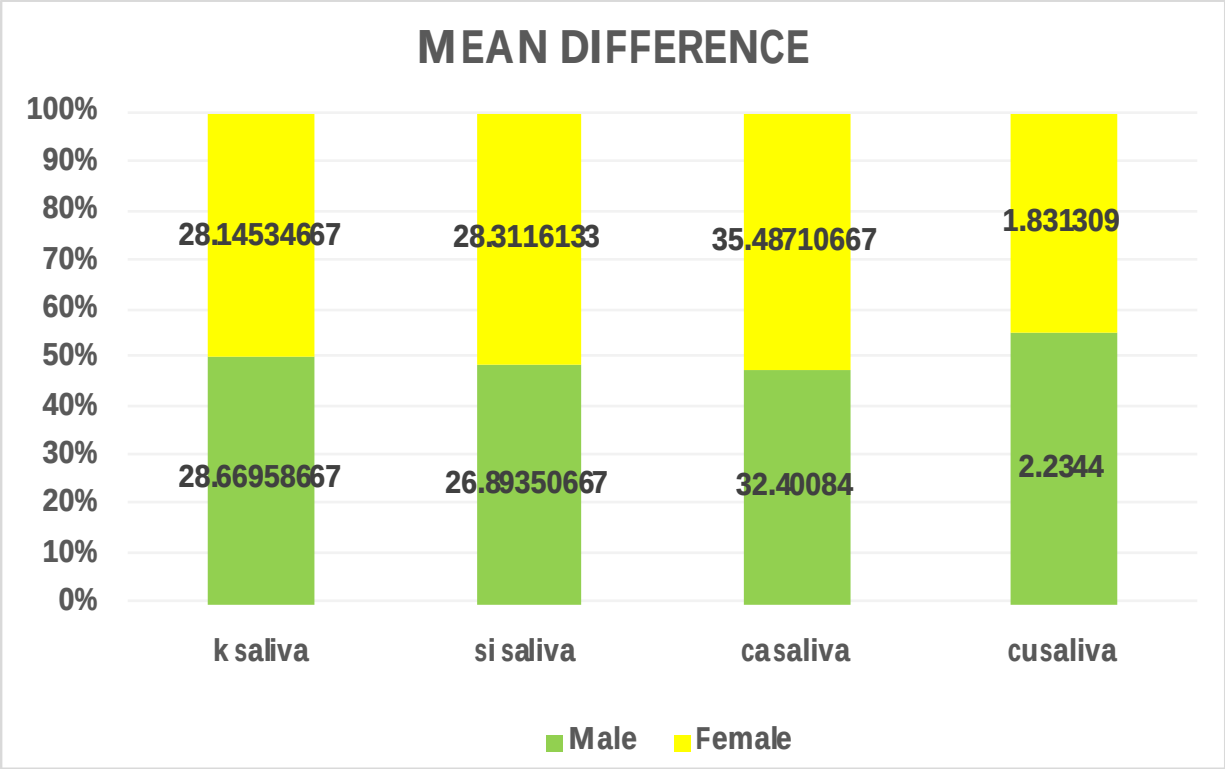
with a sterile tissue paper and ethyl alcohol. Between 4 samples, it is cleaned with diethyl ether and standardized with distilled water to check the calibration of the instrument.

3. RESULTS

The mean difference of male and female saliva and urine composition is as under.

	k saliva	Si saliva	CA saliva	cu saliva
Male	28.66958667	26.89350667	32.40084	2.2344
Female	28.14534667	28.3116133	35.48710667	1.831309

Table: 1 Mean difference in between Male and Female saliva metal content.



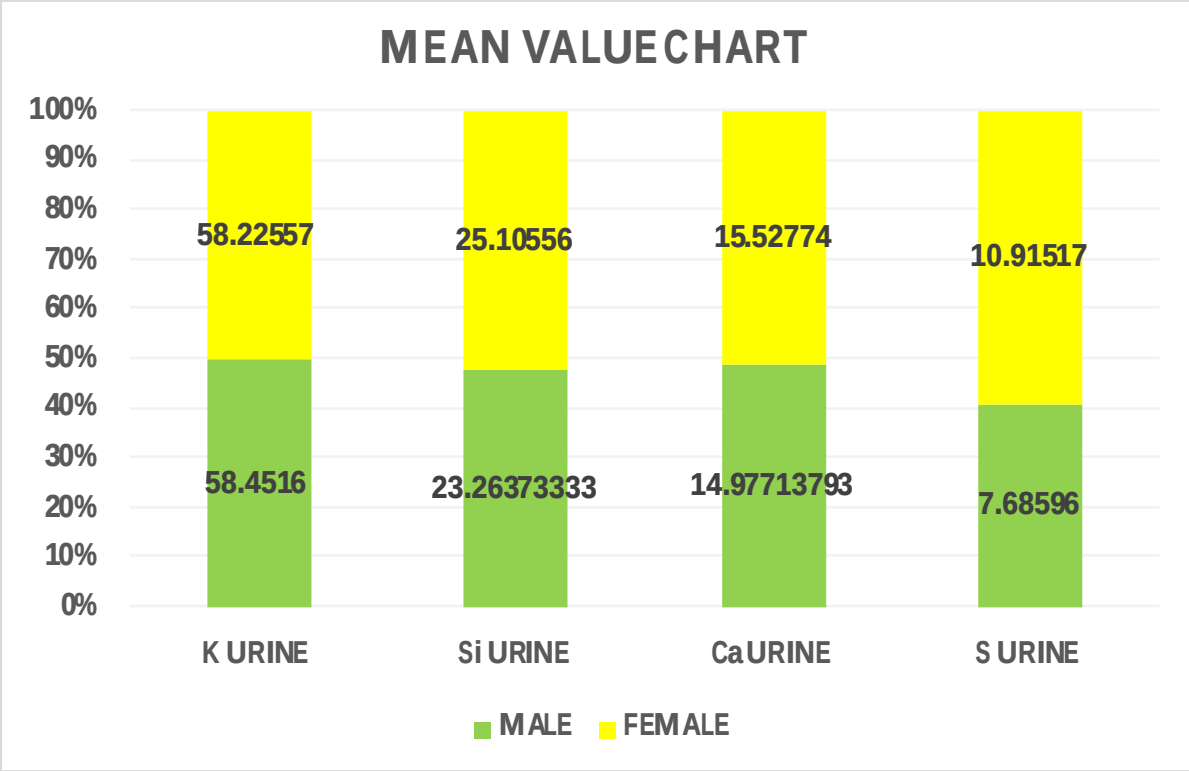
Standard deviation error bar chart will show the correlation in between the collected sample's values regarding the samples.

ISSN:0971-1260
Vol-22- Issue-14-December-2019

URINE ANALYSIS RESULTS

	K URINE	Si URINE	CA URIN	S URINE
MALE	58.4516	23.26373	14.97714	7.68596
FEMALE	58.22557	25.10556	15.52774	10.91517

Table 2: Mean difference in between Male and Female Urine Contents



In this study total sample size is 150, 75-Male samples and 75-Female samples respectively. So for the statistical analysis of the samples, SPSS SOFTWARE is used. As the significance level of equal variance is assumed to be 0.067(above 0.05), we continue to see the first line. The two tailed significance is 0.00(below 0.05), and it is proved that there is a significant difference between males and females saliva and urine metallic components.

ISSN:0971-1260
Vol-22- Issue-14-December-2019

Pairs		Paired difference					t	do	Sig. (2-tailed)
		Mean	Std. deviation	Std error mean	95% Confidence Interval of the Difference				
					Lower	Upper			
1	Age Male - Saliva-Cu Count Male	20.97893	2.12254	.24509	20.49058	21.46729	85.597	74	.000
2	Age Female - Saliva-Cu Count Female	21.31536	2.30025	.26561	20.78612	21.84460	80.251	74	.000
3	Age Male - Urine-Sulphur Cancan Male	15.52737	2.99120	.34539	14.83916	16.21559	44.956	74	.000
4	Age Female - Urine-Sulphur Cancan Female	12.23149	4.66607	.53879	11.15793	13.30506	22.702	74	.000

4. DISCUSSION

The secretion of saliva which includes the consistency and other physical parameters, are influenced by various factors such as the nutritional intake, seasonal variation, circadian rhythm, BMI and others [6]. The samples were collected during pre-lunch and pre- snacks time period and without any significant physical exercise because exercise may elevate the trace elements and electrolyte level in saliva [7]. The metallic component value of

Saliva and urine was found to be almost similar without any significant difference between the readings in the particular individuals. In all the samples, a same trend was noticed. This suggested that there is consistency uniformity in their metallic component value. There was a statistically significant difference found exist between male and female metallic value. This variation in the values may be attributed to a number of factors.

Connie Bales et al (2016) study states that there is difference between components of salivary secretion of males and females. In that study it has been mentioned about the total protein concentration in plasma variation between male and female [8].We suspect that these changes in composition of male and female saliva and urine reflected in the metallic component values.

ISSN:0971-1260
Vol-22- Issue-14-December-2019

5. CONCLUSION

There is a significant difference found between male and female salivary and urine metallic component value. This will be attributed to the presence of different protein concentrations, electrolyte levels in plasma, hormone levels, as well as presence of serum electrolytes, which leads to changes in the concentration of saliva and urine between both males and females. This change in concentration that influences the metallic component value of the saliva and urine helps to do a sex determination. Since this study is purely done on the basis of assessment of Metallic component values, further studies are required to verify the particular components.

6. REFERENCE

i. J. Morton et al. / Toxicology Letters 231 (2014) 179–193: Determination of 61 elements in urine samples collected from a non-occupationally exposed UK adult population.

ii. David sweet et al. Journal of forensic sciences.1997; 42(2):320-322: an improved method to recover saliva from human skin: the double swab technique.

iii. Najeba F, Mohamad S. Chemistry and Materials Research ISSN 2224- 3224 (Print) ISSN 2225- 0956 (Online)Vol.3 No.3, 2013: Heavy metals in blood and urine impact on the woman fertility.

iv. Hasan Salih et al. Turk J Med Sci(2015) 45: 443-448: Trace elements levels in the serum, urine, and semen of patients with infertility

v. K. O. Soetan et.al African Journal of Food Science Vol. 4(5) pp. 200-222, May 2010: The importance of mineral elements for humans, domestic animals and plants: A review.

vi. Patricia del vigna de Almeida et al. The journal of contemporary dental practice. 2008; 9:3. saliva composition and functions: A comprehensive review.

vii. J L Chicharro et.al Br J Sports Med 1999;33:204–207: Trace elements and electrolytes in human resting mixed saliva after exercise.

ISSN:0971-1260
Vol-22- Issue-14-December-2019

viii. Connie WBaIes, et.al The American Journal of clinical nutrition 2014: Zinc, magnesium, copper, and protein concentrations in human saliva: age- and sex-related differences.

ix. T.L. Guidotti, J. McNamara & M.S. Moses Indian J Med Res 128, October 2008, pp 524-532: The interpretation of trace element analysis in body fluids.

x. H. mitchellperry, Elizabethperry 1959: normal concentrations of some trace metals in human urine: changes produced by ethylene diaminetetra acetate.

xi. J. W. Dobbie, Mary J. B. Smith1982 Scottish Medical Journal: the silicon content of body fluids.