

## To develop the objective parameters to identify predominance of *Doshas* in urine

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### Abstract

Various characters of urine have been described in the Ayurvedic literatures. According to predominance of *Doshas* which are subjective, there is a possibility to develop the objective parameters based on the characters described in the texts by which the predominance of *Doshas* can be determined. The study was planned to examine the urine of cases having purely *Vata*, *Pitta* and *Kapha* predominant *Vyadhis* and compare these findings with the urine of cases having *Vata*, *Pitta* and *Kapha* predominant *Prakriti*, which serves as control. To select the diseased cases having predominantly single *Dosha*, *Nanatmaja vyadhis* as described in the texts and which are available in the hospital were selected. Hence, the patient having *Pakshaghata* i.e. *Vataja nanatmaja vyadhi*, *Kamala* i.e. *Pittaja nanatmaja vyadhi*, and *Sthaulya* i.e. *Kaphaja nanatmaja vyadhi* were selected. Optical density of urine was measured to characterize the urine according to *Doshas*. Temperature of urine during voiding was taken as

another parameter. To observe the difference according to *Doshas* other parameters like surface tension, specific gravity and chemical parameters were carried out to characterize the urine according to *Tridosha*. Through we observe the difference in above parameters according to predominance of *Doshas* but statistically it was not significant but we are successful in proving the colour, appearance of urine as per the description in the text.

**Key words:** *Ashtasthana Pariksha*, *Mutra Pariksha*, Optical Density, specific gravity, surface tension.

### Introduction:

The diagnosis of diseases since ancient time is mainly based on clinical features supported by clinical examination. The laboratory investigations specially the chemical investigations were not performed rather than it was confined to the physical examinations especially by the body fluids and the excreta. For the

diagnosis of various aspects of disease and diseased person, several methods have been described in Ayurvedic texts. These can be broadly classified into *Roga* and *Rogi pariksha*<sup>1</sup>. Several methods of *Roga Rogi Pariksha* like *Ashtasthana Pariksha*<sup>2</sup> *Dashavidha Pariksha*, *Dvadashavidha Pariksha* are described in Ayurvedic classics. Examination based on laboratory investigations is rather a late development pertaining to medieval period. *Mutra Pariksha*<sup>2</sup> and *Purisha Pariksha* was the main laboratory investigative tools in the past and included under *Ashtasthana Pariksha*<sup>2</sup>. Various characters of urine have been described in the texts according to predominance of *Doshas* which are subjective. The study was planned to examine the urine having purely *Vata*, *Pitta* and *Kapha* predominant *Vyadhis* and compare these findings with the urine having *Vata*, *Pitta* and *Kapha* predominant *Prakriti*, which serves as control. To select the diseased cases those patient having predominantly single *Dosha*, *Nanatmaja vyadhis* as described in the texts and which are available in the hospital were selected. Hence, the patient having *Pakshaghata* i.e. *Vataja nanatmaja vyadhi*, *Kamala*

i.e. *Pittaja nanatmaja vyadhi*, and *Sthaulya* i.e. *Kaphaja nanatmaja vyadhi* were selected. Optical density of urine was measured to characterize the urine according to *Doshas*. Temperature of urine during voiding was taken as another parameter. To observe the difference according to *Doshas* other parameters like surface tension, specific gravity and chemical parameters were carried out to characterize the urine according to *Tridosha*. Thirty cases were registered in both, control and diseased groups. Each group were again subdivided into three subgroups and categorized as *Vataja*, *Pittaja* and *Kaphaja* having ten cases each.

### Characteristics of *Mutra* on the basis of *Tridosha*:

According to *Vasavarajiyam*, *Vata* predominant *Mutra* resembles *Ghritodaka*, *Pitta* predominant *Mutra* shows *Rakta varna* and *Kaphaja mutra* is frothy, transparent and cold in touch and white in colour *Dwandwaja doshaja mutra* shows character of both the *Doshas* as the case may be.<sup>3</sup>

According to *Sharangdhara samhita*, urine predominant with *Vata dosha* is *Panduravarana*, *Pitta pradhana mutra* is both yellowish and bluish in colour and

*Kapha pradhana mutra* is whitish and contains froth. *Rakta pradhana mutra* is reddish in colour.<sup>4</sup>

*Yogaratanakra* has described that the *Vata pradhana mutra* exhibits *Pandura varna*, *Pitta pradhana mutra* shows red colour and *Kapha pradhana mutra* shows frothy character. *Dvandvaja mutra* shows character of both the *Doshas* and *Sannipataja mutra* shows black colour.<sup>2</sup>

According to *Vangasena*, *Pitta predominant mutra* shows red or yellow in colour and dense in consistency. *Kapha pradhana mutra* shows white in colour and is dense in consistency and sticky in nature. *Dvandvaja* and *Sannipataja mutra* shows all the characteristics of two or three *Doshas* respectively.<sup>5</sup>

According to *Bhavaprakasha*, *Vata predominant mutra* is *Pandura varna*, *Pitta predominant mutra* is red as well as bluish in colour, *Kaphaja predominant mutra* shows frothy character and *Rakta predominant mutra* shows red colour.<sup>6</sup>

## Material and Methods

Various characters of urine have been described in Ayurvedic texts according

to predominance of *Doshas*. The characters which are described are mainly colour and few other characters have been described like transparency, consistency, presence of froth and touch. It is very difficult to identify the urine predominance of various *Doshas* on the basis of above characters because these are subjective in nature and there may be visual errors. Hence, it was planned to develop objective parameters as far as possible by measuring the Optical density, which was measured by colorimetry to identify *Varna*, at 420 nm, temperature by digital thermometer recorded during voiding, reaction and specific gravity by dipstick. The surface tension was estimated by KRUSS Tensiometer. All the chemical examination of urine was conducted by dipstick and reading was taken in automated urine analyzer. Other parameters like colour, froth and appearance of urine were done by visual method.

## Selection of cases:-

The cases of *Vataja Nanatmaja vyadhi* i.e. *Pakshaghata*, *Pittaja Nanatmaja vyadhi* i.e. *Kamala* and *Kaphaja Nanatmaja vyadhi* i.e. *Sthaulya* were

selected as per the symptoms mentioned in Ayurvedic texts.

Similarly, the apparently healthy subjects having *Vata*, *Pitta* and *Kapha*

predominant *Prakriti* were selected as per the standard proforma.<sup>7</sup>

## OBSERVATIONS AND RESULT

**Table No. 1: Showing Optical density of urine**

Groups	Optical density		Comparison between healthy and diseased group unpaired t test
	Healthy	Diseased	
<b>V</b>	0.06 ±0.03 Min-0.02 Max-0.14	0.23 ±0.20 Min- 0.02 Max-0.46	t= -2.536 P= 0.021(S)
<b>P</b>	0.07 ±0.04 Min- 0.02 Max-0.17	0.37 ±0.29 Min-0.05 Max-0.84	t= -3.104 p=0 .006(HS)
<b>K</b>	0.09 ±0.05 Min- 0.02 Max-0.19	0.05 ±0.02 Min- 0.03 Max-0.08	t= 2.019 P= 0.05(S)
<b>Within the group comparisons one way anova</b>	F=0.84 P=0.44 (NS)	F=5.72 P=0.008 (HS)	-

On statistical comparison, the difference of O. D. between *Vataja* healthy and diseased subjects, *Pittaja* healthy and diseased subject was highly significant and it was only significant

between *Kaphaja* healthy and disease subject. On comparison between interprakriti in healthy subject it was found not significant but in diseased subject it was found highly significant.

**Table No. 2: Showing Temperature of urine at the time of voiding**

(Room temperature ranges from 18-25°C)

Groups	Temperature in °C		Comparison between healthy and diseased group unpaired t test
	Healthy	Diseased	
<b>V</b>	36.28±3.92 Min- 29 Max-41	36.30±1.81 Min- 33 Max-39	t=0.017 P=0.987 (NS)
<b>P</b>	36.37±6.79 Min- 36 Max-38	36.37±0.57 Min- 35.5 Max-37	t=0.965 p=0.347 (NS)
<b>K</b>	35.93±1.17 Min- 34 Max-38	35.89±0.49 Min- 36 Max-37	t=0.099 P=0.922 (NS)
<b>Within the group comparisons one way anova</b>	F= 0.32 P=0.72 (NS)	F=0.52 P=0.72 (NS)	-

It was observed that the difference of temperature of urine during voiding was not significant either between healthy

and diseased cases in all the groups or in interprakti groups.

**Table No.3: Showing Specific gravity of urine**

Groups	Specific gravity		Comparison between healthy and diseased group unpaired t test
	Healthy	Diseased	
<b>V</b>	1.019± 0.006 Min- 1.010 Max-1.030	1.016±0.005 Min- 1.005 Max-1.030	t= 0 .90 P= 0.37 (NS)
<b>P</b>	1.018± .009 Min- 1.000 Max-1.030	1.020±0.010 Min- 1.000 Max-1.030	t= -0.43 p= 0.66 (NS)
<b>K</b>	1.018±0.010 Min- 1.000 Max-1.030	1.015±0.009 Min- 1.000 Max-1.030	t= 0.55 P= 0.59 (NS)
<b>Within the group comparisons one way anova</b>	F=0.03 P=0.96 (NS)	F=0.70 P=0.50 (NS)	-

The specific gravity in all the group was found within normal limits. The difference in specific gravity was

neither found significant in both healthy and diseased subjects in all the group nor in interprakiti groups.

**Table No.4: Showing colour of urine**

Group	Category	<i>Pale yellow</i>	<i>Yellow</i>	<i>Deep yellow</i>
Healthy	V	10 (100%)	0 (0%)	0 (0%)
	P	8 (80%)	2 (20%)	0 (0%)
	K	10 (100%)	0 (0%)	0 (0%)
Diseased	V	10 (100%)	0 (0%)	0 (0%)
	P	0 (0%)	4 (40%)	6 (60%)
	K	10 (100%)	0 (0%)	0 (0%)

In healthy subjects, the urine of all the cases were having pale yellow in all the groups except two cases having yellow colour in *Pittaja* group. In diseased group, the urine of all the cases

in *Vataja* group and *Kaphaja* group were having pale yellow colour. In *Pittaja* group, the colour of urine of six cases was deep yellow and yellow in four cases.

**Table No.5: Showing presence of Froth of urine**

Group	Category	Present	Absent
Healthy	V	8 (80%)	2 (20%)
	P	0 (0%)	10 (100%)
	K	0 (0%)	10 (100%)
Diseased	V	0 (0%)	10 (100%)
	P	0 (0%)	10 (100%)
	K	0 (0%)	10 (100%)

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The froth in urine was absent in all the cases of healthy groups except eight

cases in *Vataja* group. But in diseased groups, froth was absent in all the cases.

**Table No.7: Showing appearance of urine**

Transparency	Healthy(30)			Diseased(30)		
	V(10)	P(10)	K(10)	V(10)	P(10)	K(10)
<b>Opaque</b>	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
<b>Semi transparent</b>	0 (0%)	8 (80%)	10 (100%)	3 (30%)	8 (80%)	8 (80%)
<b>Transparent</b>	10 (100%)	2 (20%)	0 (0%)	7 (70%)	2 (20%)	2 (20%)

In healthy subjects, the urine of all the cases in *Vataja* group were transparent in appearance, but urine of eight cases in *Pittaja* group and ten cases in *Kaphaja* group was semitransparent in appearance.

In diseased subjects, the urine of seven cases in *Vataja*, two cases each in *Pittaja* and *Kaphaja* group were transparent in appearance whereas urine of three cases in *Vataja*, eight cases each in *Pittaja* and *Kaphaja* group was semitransparent in appearance.

**Table No.8: Showing Surface tension of urine**

Groups	Surface tension(Dynes/cm)		Comparison between healthy and diseased group unpaired t test
	Healthy	Diseased	
<b>V</b>	58.1 ±3.21 Min- 53 Max-63	58.0 ±10.13 Min- 51 Max-85	t= 0.030 P= .977(NS)
<b>P</b>	58.6 ±4.6 Min- 52 Max-67	54.6 ±4.6 Min- 48 Max-60	t= 1.920 p= 0.071(NS)
<b>K</b>	58.2 ±5.28 Min- 45 Max-65	58.2 ±5.26 Min- 51 Max-65	t= 0.009 P=0 .993(NS)
<b>Within the group comparisons one way Anova</b>	F=0.034 P=0.966 (NS)	F=0.808 P=0.456 (NS)	-

No statistically significant difference was found either between healthy and diseased subjects or in within the *Prakriti* groups.

## DISCUSSION:

### Observations on Optical Density (OD) of urine

Though there were little differences in maximum O.D. in healthy cases of *Vataja Pittaja* and *Kaphaja* group the mean value in all the groups does not show any statistically significant difference. In the diseased group when the difference in the mean value of O.D. among *Vataja*, *Pittaja* and *Kaphaja* group was compared, the difference was found to be highly significant.

In *Vataja* diseased group, there was a great difference in the maximum O.D. as compared to corresponding healthy group. As per the literature, *Vata* imparts *Pandura varna* in urine and also resembles *Ghritodaka* i.e. slightly yellow. In the diseased group *Vaikrirta vata* imparts more intensity of colour than the *Prakrita Vata*, hence the O.D. in the *Vataja* diseased group was more than the healthy group and this difference in O.D. was statistically significant. The

intensity of colour was more in the *Pittaja* diseased group than the corresponding healthy group because in the diseased group, the *Pitta* was *Vaikrita* whereas it was *Prakrita* in corresponding healthy group. The difference in O.D. in both *Pittaja* diseased and healthy group was statistically highly significant.

The literature says that the urine predominant of *Kapha dosha* imparts white colour in urine and due to this the *Vaikrita Kapha* in diseased group imparts more white colour in urine which diminishes the intensity of colour. Hence, the maximum O.D. was less in diseased group as compared to corresponding healthy group. The difference in O.D. in both *Kaphaja* diseased and healthy group was statistically significant.

### Observations on temperature of urine at the time of voiding

The temperature of urine during voiding corresponds to the body temperature. It was expected that according to the predominance of *Dosha*, the body temperature also differs. Since *Vata* and *Kapha* have *Sheetaguna*, it was expected that the temperature of urine in these patients during voiding should be less



than that of urine in the patients of *Pitta dosha*. It was observed that there was no such difference in mean temperature between *Vataja* healthy and diseased group. Similarly, the mean temperature of *Pittaja* healthy and diseased group was same. In *Kaphaja* healthy and diseased group, the mean temperature was almost same.

### Observations on Specific gravity of urine

The specific gravity of urine depends upon ability of the kidney to concentrate the urine and the specific gravity will increase according to the increase concentration of solutes in the urine. The value of specific gravity of urine in all the cases was within normal limit whether in healthy and diseased groups. Through the patients and healthy subjects were advised not to drink water after 10 PM, but it could not be monitored.

In healthy group, the mean value of specific gravity in *Vataja*, *Pittaja* and *Kaphaja* groups was almost same and the difference of value among these groups was not statistically significant. Similar observations were also made in the diseased groups where the difference in mean value of specific gravity among

*Vataja*, *Pittaja* and *Kaphaja* groups was not statistically significant.

### Observations on colour of urine

Ayurvedic texts have mainly described the colour of urine according to predominance of *Doshas*, which were described elsewhere. As described in the text, we could not able to detect the *Pandura varna*, colour like *Ghritodaka* as mentioned in *Vata* predominant *Mutra*, *Neela varna* as in *Pitta* predominant *mutra* etc. After collection of urine we could visualize the colours and able to categorize into pale yellow, yellow and deep yellow. *Panduravarna* literally means whitish yellow may be interpreted as pale yellow, *Ghritodaka* may be interpreted as yellow.

Accordingly, it was observed that in both the *Vataja* healthy and diseased group, the urine was pale yellow i.e. *Pandura varna* in all the cases. This finding coincides with the textual description. Similarly, the urine of all the cases in *Kaphaja* healthy and diseased group was pale yellow in colour but as described in the text that the colour of *Kapha* predominant urine is white and dense in consistency and sticky in nature, we could not find such colour in these cases.

The colour of *Pitta* predominant urine is *Rakta*, *Peeta* or *Neela* in colour as described in the text. But we could observe the colour of urine as pale yellow, yellow or deep yellow in the healthy and diseased group. As *Pandura varna* has been interpreted as pale yellow, so *Peeta* and *Rakta varna* may be interpreted as yellow or deep yellow as per the intensity of colour. In *Pittaja* healthy group, the urine of eight cases were pale yellow and only two cases were having yellow colour. But in *Pittaja* diseased group, it was observed that the urine of six cases were deep yellow in colour whereas the colour was yellow in four cases. As in diseased group, the *Pitta* is in *Vaikritavastha*, it imparted more yellow colour in urine as compared to *Prakrita Pitta* in healthy group. This observation coincides with the textual description

### Observations on presence of froth in urine

As described in literature, the froth is indicated by the terms like *Phenilam*, *Saphenam*, *Phenabudbudasamyuktam* and it is mainly seen in the urine predominant of *Kapha dosha*. But in our study, we could observe the presence of froth only in eight cases of *Vataja*

healthy group. But as per the description in literature, we could find froth neither in the urine of *Kaphaja* healthy or diseased group.

### Observations on appearance of urine

The literatures say that the urine having *Vata* predominance is *Toyasamam* i.e water like consistency and it is *Ghana* i.e. dense in consistency in *Pitta* and *Kapha* predominance. *Toyasamam* may be interpreted as transparent and the *Ghana* may be interpreted as semitransparent or opaque.

As observed, the urine of all the cases in *Vataja* healthy group and maximum cases in *Vataja* diseased group was transparent. This finding coincides with the textual description. Similarly, the urine of all the cases of *Kaphaja* and maximum cases of *Pittaja* in healthy group and significant number of cases in *Kaphaja* and *Pittaja* diseased group was semitransparent. This also shows the characters as described in the text. Hence, on the basis of appearance of urine, the predominance of *Doshas* could be identified.

### Observations on surface tension of urine

The cohesive forces between liquid molecules are responsible for surface tension. Some urinary

constituents like bile salt possess the unusual property of lowering the surface tension of urine. In this study, the surface tension was almost same in all the cases of healthy and diseased group except in *Pittaja* diseased group where low value of surface tension was recorded. As we have taken the patients of jaundice in *Pittaja* diseased group, the lower value of surface tension could be explained due to the presence of bile salt in urine. But as per the observed value, the *Dosha* predominance in urine could not be established on the basis of surface tension.

## CONCLUSION:

As the colour of urine as observed in this study was found to be pale yellow when it is predominant of *Vata dosha* and yellow to deep yellow when it is predominant of *Pitta dosha*. Similarly if the appearance of urine is transparent then the urine is predominance of *Vata dosha*. If it is semitransparent or opaque, then predominance of *Pitta* and *Kapha dosha* may be detected. These observations were in accordance with the textual description.

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