



## Survey Study

# Assessment of prognostic aspects of cancer by *Taila Bindu Pariksha*

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## Abstract

**Introduction:** For the diagnosis of various aspects of disease and diseased person, several methods have been described in the Ayurvedic texts. These can be broadly classified into *Roga* and *Rogi Pariksha*. Several methods of *Roga-Rogi Pariksha* such as *Ashtasthana*, *Dashavidha*, *Dvadashavidha Pariksha* are described. *Mutra Pariksha* was the main laboratory investigative tools in the past and it is included under *Ashtasthana, Pariksha*. There is no direct description of methodology to ascertain the prognosis of cancer in the Ayurvedic classics. *Taila Bindu Pariksha*, which is a part of *Mutra Pariksha* helps in assessing the prognosis of a disease. Eastern Cooperative Oncology Group (ECOG) had developed the scale to ascertain prognosis of cancer in 1955. These ECOG performance scale gives doctors and research scholars a scale with which they can quickly assess the functional capacity of a patient and the progress of disease. **Aim:** To evaluate the prognosis of cancer by *Taila Bindu Pariksha* and compare the results with ECOG scale. **Materials and Methods:** A pilot study was undertaken on a single group of 20 cancer patients which are advised radio or chemotherapy for further management. The urine samples collected from the patients were subjected to *Taila Bindu Pariksha*. The ECOG scale was also assessed and compared with shape and direction of spread. **Result:** In majority of the patients, the correlation was found statistically highly significant. **Conclusion:** *Taila Bindu Pariksha* may be used as an alternative method to ascertain the prognosis of the cancer patients.

**Key words:** Ayurveda, Eastern Cooperative Oncology Group scale, prognosis of cancer, *Taila Bindu Pariksha*

## Introduction

Cancer is a very complicated disease in nature with complexity at every level such as anatomy, physiology, biochemistry, molecular biology, and gene expression. So treating such disease is a big challenge. Numerous techniques are employed to combat this disease which includes surgery, radiotherapy, chemotherapy, interferon therapy, hormone therapy, and blood transfusion. Still, the mortality and morbidity rates are more in persons suffering from cancer. Hence, the prognosis of cancer is always grave.

Recently, few models have been developed to aid in prognostication. However, even the best prognostic

models perform imperfectly. The model, which combined variables from the acute physiology, age, and chronic health evaluation (APACHE II), with disease-specific variables was only able to identify 50% of the patients who died within 6 months.<sup>[1]</sup> Various performance scales have also been used in various studies for determination of prognosis. In a study using the palliative performance scale (PPS), only about 10% of patients with a score of 50% or less were expected to survive more than 6 months.<sup>[2]</sup> In other research, it was found that PPS

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scores and survival days did not differ by racial/ethnicity group. Regardless of race or ethnicity, cancer patients with lower PPS scores had reduced number of survival days.<sup>[3]</sup> These scales are mainly described in reference to prognosis of single disease and also their clinical validation is available by which accurate prognosis can be predicted for chronic diseases and in addition to diagnostic research, a renewed focus on prognostic research is needed.

Eastern Cooperative Oncology Group (ECOG) had developed the scale to ascertain prognosis of cancer in 1955. The ECOG scale is used for quick assessment of functional capacity of a patient and progress of disease by doctors and research scholars. These scales and criteria are used by doctors and researchers to assess how a patient's disease is progressing, access how the disease affects the daily living abilities of the patient and determine appropriate treatment and prognosis. It was categorized from grade 0 to 5, the mean performance of patient grade zero is normal or fully active, and increasing towards five is bad performance of patient, grade five shows "death."<sup>[4]</sup>

If one looks into Ayurvedic texts then one can find the art of prognosis was well developed in the ancient times. In 16<sup>th</sup> century AD, *Taila Bindu Pariksha* - a urine test for knowing prognosis was popular.<sup>[5-7]</sup> In this test, urine is taken in a glass vessel over which an oil drop is placed and characteristics of oil spread (rate, shape, and direction of spread) are noted down. These parameters are indicative of prognosis of diseases. *Taila Bindu Pariksha* can be used to assess prognosis in any disease based on spreading pattern, rate of spread and direction as it is not disease-specific. It was a popular prognostic tool in the past but now a days it is not specifically used, so there is a need to re-establish its utility so that it can be used in future.

## Materials and Methods

For this pilot study, 20 patients of cancer were registered from OPD and IPD of Department of Radiotherapy and Radiation Medicine, IMS, BHU, Varanasi. A detailed clinical history and examination was done and recorded in a predesigned proforma. Complete physical examination was done and recorded. ECOG scale scoring was done to ascertain the prognosis. Urine sample was collected from the patient before starting of radio or chemo therapy and up to three follow-up. *Taila Bindu Pariksha* was performed on every follow-up of patient. This study was approved by the Institutional Ethics Committee (No. Dean/2012-13/188 dated 30.08.2012). An informed consent was obtained from all the registered patients.

### Inclusion criteria

- Patients of all grades of cancer regardless of age and sex
- Patients with a histopathological proven cases of malignancies and advised for radio or chemotherapy for further management.

### *Taila Bindu Pariksha*

*Taila Bindu Pariksha* was done as per the standardized method in the previous study.<sup>[8]</sup>

The requirements for *Taila Bindu Pariksha* are:

- *Patra* (testing container): A round shaped glass petri dish is having at least 8 inch diameter and 1 cm in height

- *Taila* (oil): *Krishna Tila Taila* (black sesame oil)
- Container for collection of urine sample: A wide mouth, plastic, air tight, disposable container made up of polypropylene was selected for collection of urine
- Background: Brown color background grid paper placed below the petri dish
- Time recorder: A digital clock was kept near grid during the procedure
- Magnetic Compass: A magnetic compass to observe the direction of spread
- Digital thermometer: Digital thermometer to record temperature of urine at the time of experiment in each sample
- Recorder: Video clips were taken by Sony camera W220 (7.2 mega pixels) and analyzed in a computer with VLC media player
- Collection of urine sample: First morning urine sample (midstream) was collected
- Labeling of samples: The sample was labeled with the abbreviation of the name, type of cancer or stage with date, and follow-up of the experiment
- Place: A place where natural sunlight must easily available. A special precaution was taken so that the spread is not affected by the wind, dust, or any other disturbing elements
- Time of *Taila Bindu Pariksha*: Early in the morning (within 2 h of urine collection)
- Volume of urine: 200–250 ml of the urine sample was collected from which  $\frac{3}{4}$ <sup>th</sup> of petri dish was filled making a layer on the base, to produce a surface for oil to spread
- Size of oil drop: 12  $\mu$ l through a micropipette
- Height of the oil drop from the surface of urine: Maximum 1 cm from the surface of the urine
- Washing of testing container: Petri dish was placed in chromic acid for 24 h, then washed with tap water first and then rinsed with distilled water. After drying in oven, petri dish was used for another test.

### Procedure

This procedure has been standardized in the Department of Vikriti Vigyan in collaboration with Department of Biophysics, Faculty of Medicine, I.M.S, B.H.U, Varanasi. A petri dish was filled with urine and test was performed when urine surface becomes still. The test was performed within 2 h of collection to get the accuracy of the result as the surface tension of urine is static during this period. When urine surface becomes still, oil drop of 12  $\mu$ l volume was dropped with micro pipette from a maximum height of around 1 cm. The nature of spread, direction, final shape after complete spread were observed for interpretation of result. Photographs were taken after full spread and margins of oil film were sketched out in computer to make the shape more conspicuous. Direction of spread was recorded by magnetic compass.

### Criteria for assessment

#### *Assessment of Taila Bindu Pariksha*

On analysis of the various shapes described in the Ayurvedic texts, it was concluded that if the shape of the oil after spread is circular or oval, then the prognosis is said to be good. But if the shape is linear, irregular, and circular with many projections, then the prognosis is said to be bad.<sup>[9]</sup>

*Assessment of the Eastern Cooperative Oncology Group scale*

Observation	Grade
Fully active, able to carry on all re-disease performance without restriction	0
Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g., light house work, office work	1
Ambulatory and capable of all self-care but unable to carry out any work activities; up and about more than 50% of walking hours	2
Capable of only limited self-care, confined to bed or chair more than 50% of waking hours	3
Completely disabled; cannot carry on any self-care totally confined on bed or chair	4
Dead	5

**Statistical analysis**

Statistical analysis was done by using IBM-SPSS for windows software (version 16.0). It was performed by applying descriptive statics, Chi-square test,  $P < 0.05$  was considered as significant and  $P < 0.001$ ,  $P < 0.01$  as highly significant.

**Observations and Results**

**Shape of oil drop**

Before starting of radiation or chemotherapy, out of 20 cases, 6 cases were having ECOG score 2 and 14 cases were having ECOG score 3. In 6 cases which were having ECOG score 2, it was observed that five had a circular shape while remaining one had an irregular shape in *Taila Bindu Pariksha*. Similarly out of 14 cases which were having ECOG 3, only 2 cases had circular and remaining 12 cases had an irregular shape. On statistical analysis, the difference in shape was significant ( $P < 0.001$ ).

In the first follow-up, out of 20 cases, 16 cases had ECOG score 2; out of them 15 had a circular shape, and one had an irregular shape. Remaining 4 cases had ECOG score 3, from which two had circular, and two had an irregular shape and on statistical analysis, it was found significant ( $P < 0.05$ ).

In the second follow-up, there were 12 cases having ECOG score of 2, out of which 9 cases were having a circular shape, and 3 cases had an irregular shape. Similarly, remaining 8 cases having ECOG score 3, out of which two had a circular shape while 6 cases had an irregular shape which is statistically significant ( $P < 0.05$ ).

In the third follow-up, there was only 1 case having ECOG score 1 and was having circular shape in *Taila Bindu Pariksha*. Ten cases were having ECOG score 2 and all of them had circular shape. Remaining of 9 cases had ECOG score 3, out of which only one had circular shape while rest 8 cases were having irregular shape. On statistical analysis, it was found highly significant ( $P < 0.001$ ) [Table 1]. Before starting of radiation or chemotherapy, out of 6 cases which were having ECOG score 2, it was observed that direction of spread was uniform in four while in 2 cases the direction was not uniform in all direction.

**Table 1: Frequency of ECOG scale according to shape of spread (n=20)**

Assessment period	ECOG scale	Shape (%)		$\chi^2$	P
		Circular	Irregular		
Initial	2	5 (71.4)	1 (7.7)	8.802	<0.001
	3	2 (28.6)	12 (92.3)		
F1	2	15 (20.0)	1 (33.3)	4.80	<0.05
	3	2 (21.4)	2 (66.7)		
F2	2	9 (15.8)	3 (33.3)	4.88	<0.05
	3	2 (14.3)	6 (66.7)		
F3	1	1 (8.3)	0 (0)	16.29	<0.001
	2	10 (83.3)	0 (0)		
	3	1 (8.3)	8 (100)		

F1: First follow-up, F2: Second follow-up, F3: Third follow-up, ECOG: Eastern Cooperative Oncology Group

Out of 14 cases having ECOG score 3, only 2 cases were having uniform spread and in rest 12 cases the direction of spread was not uniform. On statistical analysis, the difference was highly significant ( $P < 0.001$ ).

In the first follow-up, 16 cases had ECOG score 2 out of which spread was uniform in 13 cases whereas only 3 cases showed variations in the spread. Out of 4 cases having ECOG score 3, all cases showed variation in the spread and on statistical analysis, it was found significant ( $P < 0.05$ ).

On the second follow-up, 12 cases had ECOG score 2 out of which 9 cases showed spread in a uniform direction and rest 3 cases showed variation in the spread. Similarly out of 8 cases having ECOG score 3, only 1 case showed a uniform spread and rest 7 cases showed variation in the spread. On statistical analysis, it was found significant ( $P < 0.02$ ).

In the third follow-up, only 1 case was having ECOG score 1 and it showed the spread in uniform direction. Out of 10 cases having ECOG score 2, 9 cases showed uniform spread in all direction whereas only 1 case showed variation in the spread. Nine cases were having ECOG score 3 out of which only 1 case showed uniform spread whereas 8 cases showed variation in the spread. On statistical analysis, it was found highly significant ( $P < 0.001$ ) [Table 2].

**Comparison between Eastern Cooperative Oncology Group and *Taila Bindu Pariksha* parameters**

When the ECOG score was compared with the shape of spread, the coefficient of correlation of ECOG prognostic scale in relation with shape of the spread was found to be statistically highly significant ( $P < 0.001$ ) before starting of radiotherapy or chemotherapy and on the first and the third follow-up, while it was only significant in the second follow-up [Table 3].

Similarly, when the ECOG score and the direction of spread was compared, the coefficient of correlation of ECOG prognostic scale in relation with the direction of spread was found to be statistically highly significant ( $P < 0.001$ ) in each follow-up [Table 4].

**Table 2: Frequency of ECOG scale according to direction of spread (n=20)**

Assessment period	ECOG scale	Direction		$\chi^2$	P
		Uniform	Variation		
Initial	2	4 (66.7)	2 (7.3)	8.80	<0.001
	3	2 (28.6)	12 (92.3)		
F1	2	13 (100)	3 (42.9)	4.80	<0.05
	3	0 (0)	4 (57.1)		
F2	2	9 (55.7)	3 (34.0)	7.50	<0.02
	3	1 (14.3)	7 (76.0)		
F3	1	1 (8.3)	0 (0)	12.75	<0.001
	2	9 (83.3)	1 (11.1)		
	3	1 (9.1)	8 (88.7)		

F1: First follow-up, F2: Second follow-up, F3: Third follow-up, ECOG: Eastern Cooperative Oncology Group

**Table 3: Correlation of ECOG scale according to shape of spread (n=20)**

Assessment period	r	P	Correlation significant
Initial	0.627	0.003	<0.001
F1	0.629	0.003	<0.001
F2	0.492	0.027	<0.05
F3	0.596	0.006	<0.001

F1: First follow-up, F2: Second follow-up, F3: Third follow-up, ECOG: Eastern Cooperative Oncology Group

**Table 4: Correlation of ECOG scale according to direction of spread (n=20)**

Assessment period	r	P	Correlation significant
Initial	0.640	0.002	<0.001
F1	0.784	0.000	<0.001
F2	0.612	0.004	<0.001
F3	0.840	0.000	<0.001

F1: First follow-up, F2: Second follow-up, F3: Third follow-up, ECOG: Eastern Cooperative Oncology Group

## Discussion

As observed in this study, out of 20 cases, before starting of therapy there were 6 cases having ECOG score 2 and 14 cases having ECOG score 3. When subjected to *Taila Bindu Pariksha*, out of 6 cases having ECOG score 2 only 1 case showed irregular shape and rest 5 cases showed circular shape. As mentioned earlier the circular shape indicates good prognosis and irregular shape indicates bad prognosis. On applying Chi-square values it was found highly significant ( $P < 0.001$ ) [Table 3].

The ECOG score 2 was found in 16 cases in the first follow-up, 12 in the second follow-up and 10 in the third follow-up. Only 1 case showed ECOG score 1 in the third follow-up. In *Taila Bindu Pariksha*, circular shape was found in 15 cases in the first follow-up, 9 in the second follow-up and 11 cases in the third follow-up. This difference in shape was found statistically significant in the first and the second follow-up and highly significant in the third follow-up. When this shape

was compared with the ECOG score in each follow-up, the correlation was found highly significant in the first and the third and significant in the second follow-up. This shows that the prognosis observed by ECOG score matched with the prognosis predicted by spreading pattern of *Taila Bindu Pariksha*.

In *Taila Bindu Pariksha*, besides the shape of oil after complete spread, the direction of the spread also indicates the prognosis. If the spread is uniform to all direction then the prognosis is said to be good. If the spread is not uniform to all direction or spread is diagonal, then the prognosis is said to be bad. For the convenience of discussion the spread of direction have been mentioned as either uniform spread or variation in the spread.

Before starting the treatment, the direction was uniform in 4 cases out of 6 cases having ECOG score 2. Out of 14 cases, 12 having ECOG score 3 and showed variation in the spread which indicates bad prognosis both in *Taila Bindu Pariksha* and ECOG score. When it was correlated, it was statistically highly significant ( $P < 0.001$ ).

It was observed that, in the first follow-up, 13 cases out of 16 having ECOG score 2, showed uniform spread and all the 4 cases showed variation in the spread having ECOG score 3. In the second follow-up direction was uniform in 9 cases out of 12 cases having ECOG score 2 and there was variation in spread in 7 cases out of 8 cases having ECOG score 3. In the third follow-up only 1 case having ECOG score 1 and it showed uniform spread. But out of 10 cases having ECOG score 2, 9 cases showed a uniform spread and only one showed variation in the spread. Out of 9 cases having ECOG score 3, 8 cases showed variation in the spread. When the direction of spread was compared with ECOG score, the correlation was highly significant in each case. This shows that the prognosis observed by the ECOG score matched with the prognosis predicted by direction of spread of *Taila Bindu Pariksha*.

## Conclusion

It can be concluded that, ECOG score can quickly assess the functional capacity of the patient and the progress of the disease. On correlation with the ECOG score, the features of *Taila Bindu Pariksha* gave a statistically highly significant result in assessing the prognosis of the cancer. As the result is statistically significant, *Taila Bindu Pariksha* may be used as an alternative method to ascertain the prognosis of the cancer patients.

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## Conflicts of interest

There are no conflicts of interest.

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## हिन्दी सारांश

### तैल बिन्दु परीक्षा द्वारा कैंसर के गम्भीरता का आंकलन

कल्पना बी. कचरे, अनुकूल चन्द्रकर

रोग और रोगग्रस्त व्यक्ति के विभिन्न पहलुओं के निदान के लिए कई तरीके आयुर्वेदीय ग्रन्थों में वर्णित किये गये हैं। ये मोटे तौर पर रोग और रोगी परीक्षा में वर्गीकृत किया जा सकता है। मूत्र परीक्षा ही अतीत में मुख्य प्रयोगशालीय परीक्षण था और यह अष्टस्थान परीक्षा के अंतर्गत शामिल किया गया है। मूत्र परीक्षा रोग के निदान करने के साथ साथ रोग की गम्भीरता का निर्णय करने में सहायता करता है। आयुर्वेदीय ग्रन्थों में कैंसर के गम्भीरता का निर्णय करने के लिए कोई प्रत्यक्ष विधि का वर्णन नहीं है। तैल बिन्दु परीक्षा जो मूत्र परीक्षा का एक अंग है, यह किसी भी व्याधि की साध्यासाध्यता निर्णय कर सकता है। आधुनिक चिकित्सा विज्ञान में कैंसर की साध्यासाध्यता निर्णय करने के लिये इसीओजी स्कोर का प्रावधान है। इस अध्ययन में 20 कैंसर रोगियों में तैल बिन्दु परीक्षा तथा इसीओजी स्कोर द्वारा कैंसर की गम्भीरता का तुलनात्मक विश्लेषण किया गया एवं दोनों विधियों के परिणाम में समानता पाई गयी। अतः तैल बिन्दु परीक्षा को कैंसर रोग के साध्यासाध्यता निर्णय करने के लिये एक वैकल्पिक विधि के रूप में प्रयोग किया जा सकता है।