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# Statistical Interpretation of Anumana Pramana with Special Reference to Linga Paramarsha – A Review

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## ABSTRACT

*Anumana* means the cognition coming in to being after perception or *Paramarsha*. Inference is an important source of knowledge in the field of diagnosis and treatment. The symptoms described by the patient help the physician to interrogate further and to infer about the disease. Here the *Anumana* and *Linga Paramarsha* are correlated with some related modern medical statistical terminology. The present review study carried out by collecting the literature and research finding from various classical and modern text book online reports and online research articles in Google Search and PubMed Database. It is revealed that the *Linga Paramarsha* and its adnexa have got the prime role to establish the *Anumana Pramana*. The terminology as *Vyapti*, *Pakshya*, *Vyapak*, *Hetu* and *Linga Paramarsha* represents the statistical explanation of invariable correlation, sample, state of possession, concomitant relation, proof and proper consideration or reference respectively. Medical statistics is an essential concept to accomplish the *Anumana Pramana* in the purview of *Linga Paramarsha*. *Linga Paramarsha* is an essential tool in clinical practice as well as in *Ayurvedic* research.

**Keywords:** *Anumana Linga*, *Linga Paramarsha*, Statistical Inference.

## INTRODUCTION

Since the diagnostic era, in the field of Ayurveda as well as in the modern science the word *Anumana* or inference stands as a prime factor. The extraction of the word *Anumana* recites into two syllables, former is the *Anu*, means afterwards and later is the *Mana*, means to know or to measure [1]. So *Anumana* may be described as knowledge after proper observation or post observation knowledge and it implies that inferential knowledge is always preceded by direct observation [2]. Perhaps the knowledge can be categorised into two ways for diagnostic approach viz. inferential cognition and the instrument of inferential cognition. It is also categorised as observed facts and inferred facts. The former may technically termed as sign or *Linga* and latter may be termed as possessor or *Lingi* [3]. In this way, inference is the result of the knowledge of the *Linga* or characteristic sign and *Lingi* or the possessor of the characteristic mark. To establish the difference between concept of knowledge of perception and inference it is to be said that the former provides the immediate knowledge and the latter helps to understand only mediate knowledge [4]. Inference also may be described as the process of reasoning which admit us to pass from claims of present perception, or non-perceptions to claims of existence of non-existence of things not perceived at the time [5]. On the other hand, inference can be explained as the method of establishment of a hidden factor on the basis of previously observed factor. The pre-observed factor is called *Hetu* or *Sadhana* and the element to be determined is called the provable or *Sadhya* [6]. For the production of an inference, the instrument is a generalized fact and inference is the method for establishment of inferential conclusion or *Anumiti* [7]. This is more technical way in correlation to the modern statistical methods. And inferential conclusion is defined as that attained through reference or *Paramarsha* [6].

## MATERIALS AND METHODS

The ancient *Ayurvedic* literatures were looked into in search of the concepts of *Anumana* and *Linga Paramarsha*. The related statistical terminologies were searched from modern statistics text books. The online search engines i.e. Google Search and PubMed Database and others were searched with the headings, *Anumana* in *Ayurveda*, relation of *Anumana* with medical statistics, application of *Anumana* in *Ayurvedic* therapeutics, and others. The obtained information were collected and interpreted accordingly.

## Paramarsha or Linga-Paramarsha or reference

Inference begins from observing the presence of proof or *Hetu* in the sample or *Pakshya* where it has been intimated by invariable correlation or *Vyapti* with the provable or *Sadhya*. In other words, the Examiner

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considers the cause of an inference, whether for self-consideration or for other is admitted as Sign or *Linga* which is identified by *Pakshya Dharmata* and qualified by *Vyapti* and such a state of understanding is called reference or *Linga- Paramarsha* [8]. This may be identical in medical statistics as reference and it can be described as the path to demonstrate the evidence to support the assertions and trying to prove the assignments. The source of information can easily achieved by the examiner and it is a demonstrative way to record all the sources used for reading or an assignment of research work. References always be accurate and that can easily achieve and those help the reader or investigators to trace easily the source of information [9]. The technical terminologies like invariable correlation or *Vyapti*, sample or *Pakshya*, *Linga* or mark proof or reason or *Hetu* and *Pakshya Dharmata* or special feature of subject [10] are used to describe the concept of reference or *Linga Paramarsha*.

### Invariable correlation or Vyapti

*Anumana* depends upon the interrelation between *Hetu* and *Sadhya* which is termed as *Vyapti* [6]. It is also stated that *Vyapti* is the invariable and inseparable relationship termed as *Avinabhava* between two factors where a factor will not exist without the other [11]. *Vyapti* should be considerable by citing a valid example or otherwise, *Vyapti* will become invalid. It may be described as the invariable relation between *Sadhya* and *Sadhana* is related with proof or *Hetu* which indicates presence of the provable or *Sadhya*. The combination of the proof with the provable will be a directive unfaillingly. This association is called invariable correlation or *Vyapti* [6]. In the field of statistics, correlation is the relationship between two variables. Variables are corresponding to each other. If first one is changed, another will be changed immediately and it anticipates on the correlation coefficient which is stood on the products of the mean of two variables [12]. The nature of the association and whether it is positive or negative, is shown by correlation. Positive correlation is the association amidst two variables which change together with each other; wherefore, the association amidst two variables which change in opposite directions is defined as negative correlation or inverse correlation [13]. *Vyapti* is classified into two categories like positive correlation or *Anvyaya Vyapti* and negative correlation or inverse correlation or *Vyatireka Vyapti*.

### Positive correlation or Anvyaya Vyapti

It is based on the invariable relationship between reason or *Karan* and related *Karya* or action. If certain thing invariably follows the presence of another the correlation is said to be positive correlation or *Anvyaya Vyapti* as the correlation of smoke with presence of fire also [14]. In modern parameter when two related variables progress in parallel direction, their relationship is positive. The metaphor (*r*) represents the coefficient of correlation which measures the correlation. If *r* is greater than 0, it shows the positive correlation. When *r* is +1.0, there is a perfect positive correlation [15]. In this relation when one variable increases other also gets increased [12].

### Negative correlation or inverse correlation or Vyatireka Vyapti

Literally *Vyatireka* means absence. If certain being is absent, another thing also absent, the correlation is negative. In the event of fire or *Banhi* and smoke or *Dhumra*, the non-appearance of smoke demonstrates the absence of fire [14]. *Vyatireka Vyapti* perhaps

considered as the specific characteristic feature which makes it distinct from other variables. It is the negative relationship of the *Vyapya* or reason in the affirmative concomitance [16]. When two related variables move in opposite directions, their relationship is negative. If the coefficient of correlation (*r*) is lesser than 0, it is assumed that this is a negative correlation. If the result shows as, *r* is -1.0; it resumes a perfect negative correlation. Inverse correlations describe if one variable decreased as the other increased resulting the sum of the products would be negative, is called negative correlation [17]. Two factors that seesaw relative to each other. As for examples a weakening bank balance is relative to rise in spending practice and reduced fuel mileage respective to increased average driving speed [18].

### Sample or Pakshya

Sample or *Pakshya* is defined as a group of individuals taken from a larger population and used to find out something about that population [19]. in which the existence of *Vyapak* or the fact to be proved is in doubt [20]. Sample is the site or place where a set of individuals or objects collected or selected from a statistical population by a defined procedure [21]. in presence of *Sadhya* is to be inclined to think. Otherwise sample is described as the site for performance of testing. The sampling is being performed to recognize the presence of *Sadhya* and *Hetu* in the mentioned sample [22]. In other words, the *Pakshya* or Sample or subject is that in which there is doubtfulness of the things to be inferred, deprived of the desire to infer the same. Inferential methodology begins from the knowledge present in the reason or *Hetu* in the mentioned sample of *Pakshya* [23].

### The special feature of a Subject or State of possession or Pakshya Dharmata

Precise meaning of Possession is physical manipulation over an object. Explicit conception of possession in the legislation is absent. It is realistic besides a legitimated concept. It perhaps is supposed that it is the physical custody, control or occupancy of any object with a distinct intention of ownership [24]. In Ayurveda it may be demonstrate as it is self-evident as without the reason actually existing in the *Pakshya* [20]. State of relatedness of proof with the sample is called State of possession or *Pakshya Dharmata* [8]. There are two types of *Pakshya* i.e., *Sapakshya* and *Vipakshya*.

### Sapakshya

Where the *Vyapak* or the fact to be proved is definitely known to exist [20]. Prior to test the given sample, the investigator should have repeatedly experienced the *Vyapti* in a sample which is already tested for the presence of *Sadhya* Such positive sample is called *Sapakshya* [22]. Positive Sample or purposive sampling is also known as judgment, selective or subjective sample. The sampling procedure in which examiner relies upon self-judgment while choosing members of population to engage in the study. It may be called as non-probability sampling method where the examiner selects the elements for the sample preferred by self-judgment. To obtain a representative sample the examiner may believe that it should be a proper judgement which will result in time and money saving [25].

### Vipakshya

Where the fact to be proved being confirmed by the knowledge of

nonexistence [20]. If the sample is negatively tested sample; where recurrent testing is capitulated always negative results, the phenomenon is called *Vipakshya*. The sample is surely negative for absence of *Sadhya* [22]. Rather, all of them for each required sample only a small percentage of modification of the character is allowed and the problem might be modified. For the prediction of the probability to a nearby word for every word in the lexicon instead and to predict the probability of required sample words were present at neighbours or not [26].

### Linga or Hetu or proof

*Linga* is the prime factor to be introduced as the basic indicator which shows the presence of *Sadhya*. This is the gateway to expose the *Sadhya* by virtue of *Vyapti* amidst two variables [10]. The unique representation of the degree of conviction to ensure the hypothesis or postulation that is used to reassure others successive to a statistical test of the supporting evidence and the types of inferences that can be drawn from the test scores is called statistical proof [27]. The sign becomes proof or *Hetu* when used in the citation of inference or *Anumana* to establish the presence of *Sadhya*. By means of similar appearance of example or *Udaharana* which establish the *Sadhya* is called *Hetu* [28]. It also can be clarified as the reason by which establishment is preceded of *Sadhya* through the homogeneous or affirmative character of the example [29]. *Vyapti* or *Linga* is of three types as follows -

### Anvyaya-Vyatireki Linga or Positive-Negative Correlation

Positive correlations mean, indeed a connection amidst two variables. The *perfect* positive correlation indicates the value of 1. If the value is 0, there is no correlation as the predecessor variable has absolutely functiolaesa with successor. The worth of -1 represents the perfectly negative correlation. Otherwise [30], it is such sign or *Linga* where the *Hetu* is testimonial to the pervading inference in concern to *Vyapti* and both are by presence or absence and where the *Linga* and *Sadhya* satisfy both positive and negative correlation, such a sign is called *Anvyaya-Vyatireki Linga* [14].

### Kevala – Anvyayi Linga or perfect positive correlation

Perfect positive correlations, which deals with the relationship between two variables that resemble like other and exists at the same time [31]. The sign or *Linga* which deals with only positive correlation and where it is only provable. Here negative correlation cannot be justified by citing an instance, because it clarifies the non-existing things and a *Vyapti* is valid only when it is justified with an example [32].

### Kevala Vyatireki Linga or perfect negative correlation

It takes place where there exists no similar subject of conclusion. Here, the negative correlation only or *Kevala Vyatireki Linga* is legitimated. Negative correlation is described as a relationship between two variables where former is increased as the later decreases, and it stands in directly proportional relationship. The following statistical values represent the different correlation: value of: -1.0: perfect negative correlation Value of: 0: No correlation And value of: +1.0: perfect positive correlation [33].

A perfect negative correlation or *Kevala Vyatireki Linga* indicates the

association of two different factors is antithesis always [34]. As the earth is different from other, because it has smell. It cannot be established the positive correlation in another aspect other than earth as because earth possesses smell only [32].

## RESULT & DISCUSSION

Inference as follows direct perception or *Pratykshya* and is of three types pertaining to three phases as past, present and future respectively. To infer the *Banhi* from *Dhumra*, both of them exist at the time of inference; so the inference pertains to present. As a pregnant lady supposed to infer the coitus in the past. Here the factor inferred pertains to past. It is same as Retrospective Inference or *Atita Anumana*. A seed infer that it will become a plant and will bear fruits in the future. This inference pertains to future. It is otherwise called prospective inference or *Anagata Anumana* where *Anagata* means yet not come [2]. It is also useful method of knowledge in favour of rebirth theory described by *Charaka Samhita* as the actions performed in previous life, which are unavoidable, eternal and having continuity is known as faith. Its results are enjoyed in the present life. Actions performed in the present life will bring about its results in full time. As the seed is inferred from the fruit and the fruit from the seed. Apart from this concept, inference is an important source of knowledge in the field of diagnosis. The sign present in the patient can be observed in terms of *Pratykshya* directly but the symptoms described by the patient help the physician to interrogate further and to infer about the disease with consideration of *Linga Paramarsha*.

Statistical inference is the process by which inferences about a particular population based on certain characteristics feature estimated from a sample of data taken from the population to enhance the field of diagnosis [35]. To establish the knowledge of inference it is to be described that knowledge of the invariable concomitance is mentioned as the instrument. Consideration is mentioned as the operation. To explain this phenomenon an example is established as an individual who has noticed in a kitchen etc., that smoke or *Dhumra* in a concomitant or *Vyapya* relationship of the fire or *Banhi*, happens to see afterword or *Anu* on a mountain or such, a trail of smoke connected with the surface. Then the individual look back on the invariable concomitance or *Vyapti* that smoke in a concomitant or *Vyapya* relationship of fire. Next he has the knowledge that the mountain is possessed of smoke which is a concomitant of fire. Sign or *Linga* actually being known and it must be present at the time of inference, as a concomitant is the instrument of inference [36]. The knowledge that the concomitant or *Vyapya* exists in the subject or *Pakshya* called consideration or *Paramarsha*. So the knowledge that apprehends the relation of concomitance to the subject is the cause of inference [37].

It is also stated that the cognition of smoke in the kitchen while ascertaining the invariable concomitance of smoke with fire in the manner described above, is the first step. The cognition of smoke is the subject, mountain etc., is the second step. The individual think back of the *Vyapti* and incorporates as the mountain has smoke which is invariably concomitant with fire and this apprehension is mentioned as third step. This third steps should necessarily be accepted otherwise the intimate knowledge will stop at the level of apprehension where presence of *Dhumra* is related with existence of *Banhi*. This is mandatory to receive the discernment of *Dhumra* which is invariably concomitant with *Banhi*. This apprehension is acknowledged with *Linga*

*Paramarsha*. This being the direct instrument of *Anumiti* and said to be *Anumana* or inference. All the three cognition mentioned around the *Hetu*, *Dhumra* in the present case. The first description is mentioned as *Vyaptijyana*. The second step immediately makes one recollect the *Vyapti* by the law of association. By this recollection the two previous cognitions merge together to form a complex cognition called *Paramarsha*. Immediately after the phenomenon the individual gets the *Anumiti* which same as *Anumana*. If the third steps or *Paramarsha* is not accepted we would end with the remembrance of the *Vyapti* and that by itself will not be sufficient to produce the cognition or *Vyapak* or *Sadhya* present in the subject [38]. So, statistical inference is important to analyze data properly. Indeed, proper data analysis is necessary to interpret research results and to draw appropriate conclusions with the proper consideration of *Linga Paramarsha*.

## CONCLUSION

*Anumana* or inference is an important measure in Ayurvedic diagnostics. It helps to get the accurate knowledge regarding diseases in various medical fields. Specially the *Ayurvedic* pathogenesis is based on inference as the method to diagnose the real problem. The holistic principles of Ayurveda can be explored with broader and deeper insight. The terminology as *Vyapti*, *Pakshya*, *Pakshya Dharmata*, *Vyapak*, *Hetu* and *Linga Paramarsha* represents a full array of recommendation for statistical explanation of invariable correlation, sample, state of possession, concomitant relation, proof and proper consideration or reference respectively. These concepts have a comprehensive area of influence of the different biological testes which provides a base to infer about the particular disease. This understanding is closely related to the concept of *Linga Paramarsha*. These recommendations of *Ayurvedic* science can be interpreted as statistical inference.

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