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Original Article

Evaluation of some objective parameters for *Ushna* and *Sheeta Gunas* based on pharmacological study

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Abstract

In the formation of a principle, the experimental study plays a pivotal role. After repeated experiments under the same conditions, if one finds the same results, then a principle is formed. Ayurvedic principles which were formulated on the basis of keen observations and through special senses need to be reassessed through contemporary scientific tools. The principles of *Ushna* (hot) and *Sheeta* (cold) *Gunas* (properties) need to be assessed and evaluated through various animal experiments so as to suggest parameters which can be suitable for the evolution of these *Gunas*. The present study is an attempt to find out the possibility of employing simple experimental parameters to assess these *Gunas* in selected drug substances and the data generated through this study were analyzed. The obtained results are encouraging to develop the same. All details are presented in this paper.

Key words: Parameters, *Sheeta Guna*, *Ushna Guna*.

Introduction

Pharmacology is the science of drugs in a broad sense; it deals with the interaction of exogenously administered chemical molecules (drug) with living systems and pharmacodynamics is one of its branches, which includes physiological and biochemical effects of drugs and their mechanism of action at macromolecular level or subcellular or organ system levels. This same definition of pharmacodynamics can be incorporated with that of *Gunas* as the effects of *Gunas* are recognized by their action on the body, i.e. physiological variations. These types of variations are always studied under controlled conditions like environment, daily intake of diets and drinks, sleep, etc., which are more appropriate for clinical study, but not possible, even in the hospital attached institute. On the other hand, almost all the above conditions can be met through animal experiments. Moreover, experimental research has been preferred and extensively used in the biomedical field, so it is considered better than observational type of research. Hence, this study was carried out with the following aims and objectives: 1) to assess the effect of *Ushna* (hot) and *Sheeta* (cold) *Gunas* (properties) through various animal experiments and 2) some attempts are made to suggest parameters which would be suitable for the evolution of the above *Gunas*, with the help of results obtained and from the data generated.

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DOI: 10.4103/0974-8520.72368

Materials and Methods

Materials

Drugs

All the drugs mentioned in the table below were used separately as a test drug [Table 1].

Animals

The study was carried out in Wistar albino rats of either sex, breed, and they were maintained under the ideal animal husbandry conditions in the animal house attached to pharmacology laboratory, I.P.G.T. & R.A. They were maintained on Pranava Agro industries, Vadodara, Gujarat "Amrut" brand rat pellet feed and tap water given *ad libitum*. The animals were exposed to natural day and night cycles. The experiments were carried out after obtaining permission from Institutional Animal Ethical committee.

Procurement of test drugs

The drugs having good quality and genuineness were supplied in a powder form by the pharmacy attached with I.P.G.T. & R.A., Jamnagar, India Selected powdered drugs were made into suspension in distilled water and administered to the respective groups.

Dose

The dose of drug was fixed by extrapolating the human dose to rats on body surface area ratio as per the table of Paget's and Barnes.[1] Human dose of Chitrak is 4 g/day, conversion factor for rat = 4000 mg × 0.018; therefore, dose for 200 g rat = 72 mg and for 1 kg rat = 72 5 = 360 mg/kg body weight. The human dose for the remaining five drugs (*Ativisha*, *Yavanee*,

Table 1: Details of drugs under trial

Name	Form of drug	Latin name	Category
Shwet-Chitrak	*Choorna* (powder)	*Plumbago zyllenica.* Linn.	*Ushna Gunayukta Dravyas*
Ativisha	*Choorna*	*Aconitum hetrophyllum* Wall.	
Yavanee	*Choorna*	*Trachyspermum ammi.* Linn.	
Gokshur	*Choorna*	*Tribulus terrestris* Linn.	*Sheeta Gunayukta Dravyas*
Musta	*Choorna*	*Cyperus rotundus* Linn.	
Usheer	*Choorna*	*Vetiveria zizanoides* (Linn.) Nash	

Gokshur, Musta and *Usheer)* is 6 g/day, conversion factor for rat = 6000 mg × 0.018; therefore, dose for 200 g rat = 108 mg and for 1 kg rat = 108 × 5= 540 mg/kg body weight.

Route of administration

The drugs were administered orally through a gastric catheter sleeved on to a syringe.

Experimental models

Metabolic study

This study was carried out to fulfill the aim, i.e. evaluation of *Deepan* and *Paachan* activities of selected drugs having *Ushna* and *Sheeta Guna* dominance in albino rats. The experiment was originally designed by Dr. U. D. Dixit, Prof. R. R. Dwivedi and Dr. B. Ravishankar in 1995 to asses the effect of test drugs on status of *Agni*.[2] In the present study, same model was adopted with marginal modification. The protocol of the experiment was designed by observing the effect of treated groups on the following five factors:

1. food consumption
2. fecal output
3. food conversion ratio
4. water intake
5. weight gain

Methods

A total of seven groups, each containing six rats of either sex, weighing between 200 and 250 g, were used. Experiment was performed in two phases.

phase I: preliminary study (duration 5 days)

phase II: therapeutic study (duration 10 days)

Preliminary study was carried out prior to the therapeutic study to understand and obtain baseline data about the normal quantity of food and water intake of the experimental animals.

Preliminary study

Initial weights of the rats were recorded and the rats were placed in separate metabolic cages. Metabolic cages had special arrangements for keeping food and placing water, which prevented admixture of food with fecal matter. As the urine was drained out, the fecal matter could be collected easily from the cages. In this phase, food intake, water intake, fecal output and food conversion ratio (FCR) were measured on a routine basis. The procedure was continued up to 5 days. After the completion of the preliminary study, body weights were measured again. In this particular phase, drug was not administered.

Therapeutic study

In this phase, the animals were administered the selected drugs as per the calculated doses. All the previously mentioned parameters were recorded daily for 10 consecutive days; the final weights of the rats were recorded at the end.

Assessment of parameters

Method of estimation of food consumption

Each rat was provided 40 g dry pellet per day to ensure maximum food consumption according to its capacity. The residual food was collected on the next day and weighed. The total amount of food consumed by an animal in 24 hours was obtained by deduction of the remaining food from the allotted 40 g. This was the absolute value of food consumed in grams. Food consumed in g% of body weight per day was calculated by applying the rule of 3. This is the relative food value of food consumption.

Method of estimation of water consumption

Exactly 100 ml of tap water was provided to each rat in a labeled bottle every day and the water remaining in each bottle was noted down on the next day. Total amount of water intake in animal was calculated by the deduction of the remaining water in the feeding bottle from 100 ml. Method similar to the one described above was adopted to calculate the water intake in ml% of the bodyweight/day.

Method of estimation of weight of fecal matter

The total fecal matter passed by each individual rat was collected separately and kept in an oven at 80°C for 6 hours. Weight of dry fecal matter was then calculated in an electronic balance. Stool passed in g% of body weight per day was obtained by applying rule of 3. This is defined as relative weight of fecal matter.

Method of obtaining the food conversion ratio

Method I: The food consumed by a rat in grams/day was divided by the amount of fecal matter passed in grams during the same day in a particular rat. This is taken as absolute conversion ratio (FCR).

Method II: The gram percentage of food consumed by a rat was divided by the gram percentage of the fecal matter passed on the same day by that particular rat. This is defined as relative FCR.

Method of estimation of total assimilation

The difference in the body weight before and after therapy indicates the total assimilation of food into body as a result of metabolic activity influencing the effect of therapy.

Observation and Results

Mean value (with SE) of each group was calculated accordingly

and data generated were compared with the control group as well as data obtained during the preliminary study of the respective groups.

Effect of *Ushna Gunayukta* drugs on food consumption

When the data were expressed as absolute values, an apparent increase in food consumption was observed in all the groups when the values of initial pre-drug period were compared to those of post-drug period. However, this increase was found to be statistically significant only with respect to *Chitraka* administered group. When between-group comparisons were made, no significant difference could be observed. When the data were presented as relative food consumption, an apparent decrease in food consumption was observed in the test drug administered group and an apparent increase was observed in the control group. However, the observed changes were found to be statistically nonsignificant [Table 2].

Effect of *Sheeta Gunayukta* drugs on food consumption

When the data were presented as absolute values, an apparent increase in food consumption was observed in control rats and Musta and Usheer administered groups, whereas an apparent decrease was observed in Gokshur administered group. However, the observed changes were found to be statistically nonsignificant. When the data were presented as relative values, an apparent marginal increase was observed in the control group and marginal to moderate decrease was observed in the three test drug administered groups. However, the observed changes were found to be statistically nonsignificant [Table 3].

Effect of *Ushna Gunayukta* drugs on water consumption

When the data were considered in terms of absolute values, nonsignificant increase in water intake was observed in control and Ativisha groups, while a marginal decrease was observed in *Chitraka* and Yavanee groups. When the data were presented as relative values, a nonsignificant decrease was observed in both control and test drug administered groups. This indicates that the *Ushna* property drug does not influence water consumption to a significant extent [Table 4].

Effect of *Sheeta Gunayukta* drugs on water consumption

When the data were presented in terms of absolute values, nonsignificant increase in water intake was observed in Gokshur group and control group, whereas a nonsignificant decrease

Table 2: Effect of test drugs (*Ushna Gunayukta* drugs) on food consumption in rats

Group	Average daily food consumption (g)			
	Data expressed as absolute values		Data expressed as food consumed/100 g body wt. (relative value)	
	Pre-drug[a]	Post-drug[b]	Pre-drug[a]	Post-drug[b]
Control	16.26 ± 01.30	19.83 ± 02.32	07.40 ± 02.14	07.62 ± 00.44
Chitrak	12.66 ± 01.66	18.30 ± 01.31*	08.50 ± 02.05	07.97 ± 00.34
Ativisha	17.80 ± 02.03	18.00 ± 00.49	08.33 ± 02.70	07.81 ± 00.40
Yavanee	18.06 ± 02.17	19.30 ± 01.94	07.96 ± 02.14	07.51 ± 00.55

Data: mean ± SEM; [a]5 days average (preliminary study); [b]10 days average (therapeutic study); *$P < 0.05$ (paired "t") in comparison to pre-drug period

Table 3: Effect of test drugs (*Sheeta Gunayukta* drugs) on food consumption in rats

Group	Average daily food consumption (g)			
	Data expressed as absolute values		Data expressed as food consumed/100 g body wt. (relative value)	
	Pre-drug[a]	Post-drug[b]	Pre-drug[a]	Post-drug[b]
Control	16.26 ± 01.30	19.83 ± 02.32	07.40 ± 02.14	07.62 ± 00.44
Gokshur	18.66 ± 00.89	18.56 ± 01.82	08.56 ± 01.32	07.67 ± 00.53
Musta	18.06 ± 01.76	21.33 ± 01.86	08.87 ± 02.51	08.65 ± 00.35
Usheer	17.26 ± 01.68	18.56 ± 01.12	08.34 ± 02.38	07.71 ± 00.42

Data: mean ± SEM; [a]5 days average (preliminary study); [b]10 days average (therapeutic study)

Table 4: Effect of test drugs (*Ushna Gunayukta* drugs) on water intake in rats

Group	Average daily water intake (ml)			
	Data expressed as absolute values		Data expressed as water intake /100 g body wt.	
	Pre-drug[a]	Post-drug[b]	Pre-drug[a]	Post-drug[b]
Control	22.50 ± 00.93	23.23 ± 01.68	10.45 ± 01.47	09.45 ± 01.38
Chitrak	22.16 ± 01.24	20.85 ± 00.98	10.67 ± 00.60	09.23 ± 00.69
Ativisha	21.16 ± 00.96	21.98 ± 00.79	09.87 ± 00.83	09.51 ± 00.48
Yavanee	24.66 ± 01.07	24.26 ± 00.83	11.02 ± 00.72	09.55 ± 00.51

Data: mean ± SEM; [a]5 days average (preliminary study); [b]10 days average (therapeutic study)

was observed in Musta and Usheer groups. When the data were presented as relative values, a nonsignificant decrease was observed in all the groups, including control group [Table 5].

Effect of *Ushna Gunayukta* drugs on fecal output

A nonsignificant increase in fecal output was observed in all the groups, including control group, when the data were presented in terms of absolute values. But, when the data were presented as relative values, a nonsignificant decrease was observed in Chitrak and Yavanee groups and an increase in Ativisha and control groups [Table 6].

Effect of *Sheeta Gunayukta* drugs on fecal output

When the data were presented as absolute values, an apparent but statistically nonsignificant increase was observed during post-drug period in comparison to pre-drug period. When the data were presented as relative values, only a marginal increase was observed in most of the groups, with none of the differences being statistically significant [Table 7].

Effect of *Ushna Gunayukta* drugs on food conversion ratio

In control group, a moderate but statistically nonsignificant increase in food conversion was observed. In test drug administered group, an apparent weak to moderate decrease was observed. The decrease was 13.24% in Citraka treated group, 29.04% in Ativisha treated group and 7.7% in Yavanee treated group. However, the observed decrease did not reach statistically significant level [Table 8].

Effect of *Sheeta Gunayukta* drugs on food conversion ratio

In the control group, an apparent but statistically nonsignificant decrease in food conversion was observed. In Gokshur administered group, a marginal increase was observed, while in the remaining two groups, a nonsignificant marginal decrease was observed [Table 9].

Effect of *Ushna Gunayukta* drugs on body weight

The data depict an apparent but statistically nonsignificant decrease in actual changes in the body weight of albino rats treated with test drugs having *Ushna* property in comparison to the control group [Table 10].

Effect of *Sheeta Gunayukta* drugs on body weight

The Gokshur treated group shows a marked but statistically nonsignificant decrease in body weight in comparison to control group. However, an opposite effect was observed with the other *Sheeta* property drugs, i.e. Musta and Usheer, in comparison to control group, but was found to be statistically nonsignificant [Table 11].

Table 5: Effect of test drugs (*Sheeta Gunayukta* drugs) on water intake in rats

Group	Average daily water intake (ml)			
	Data expressed as absolute values		Data expressed as water intake/100 g body wt.	
	Pre-drug[a]	Post-drug[b]	Pre-drug[a]	Post-drug[b]
Control	22.50 ± 00.93	23.23 ± 01.68	10.45 ± 01.47	09.45 ± 01.38
Gokshur	20.40 ± 00.81	21.60 ± 00.79	09.30 ± 00.37	09.05 ± 00.38
Musta	23.80 ± 01.37	23.01 ± 01.21	11.60 ± 00.54	09.55 ± 00.60
Usheer	24.43 ± 01.17	23.76 ± 01.63	11.84 ± 00.93	09.97 ± 00.89

Data: mean ± SEM; [a]5 days average (preliminary study); [b]10 days average (therapeutic study)

Table 6: Effect of test drugs (*Ushna Gunayukta* drugs) on fecal output in rats

Group	Average daily fecal output (g)			
	Data expressed as absolute values		Data expressed as fecal output /100 g body wt.	
	Pre-drug[a]	Post-drug[b]	Pre-drug[a]	Post-drug[b]
Control	03.18 ± 00.31	04.01 ± 00.42	01.43 ± 00.16	01.57 ± 00.13
Chitrak	03.46 ± 00.43	03.68 ± 00.30	01.65 ± 00.19	01.61 ± 00.13
Ativisha	03.10 ± 00.54	03.77 ± 00.18	01.47 ± 00.29	01.63 ± 00.10
Yavanee	03.36 ± 00.39	03.77 ± 00.37	01.50 ± 00.14	01.46 ± 00.08

Data: mean ± SEM; [a]5 days average (preliminary study); [b]10 days average (therapeutic study)

Table 7: Effect of test drugs (*Sheeta Gunayukta* drugs) on fecal output in rats

Group	Average daily fecal output (g)			
	Data expressed as absolute values		Data expressed as fecal output /100 g body wt.	
	Pre-drug[a]	Post-drug[b]	Pre-drug[a]	Post-drug[b]
Control	03.18 ± 00.31	04.01 ± 00.42	01.43 ± 00.16	01.57 ± 00.13
Gokshur	03.22 ± 00.36	03.40 ± 00.33	01.50 ± 00.14	01.46 ± 00.06
Musta	03.22 ± 00.43	03.96 ± 00.40	01.57 ± 00.20	01.60 ± 00.08
Usheer	03.14 ± 00.32	03.87 ± 00.27	01.54 ± 00.23	01.60 ± 00.10

Data: mean ± SEM; [a]5 days average (preliminary study); [b]10 days average (therapeutic study)

Discussion

Food intake and food conversion ratio

Increased food intake is indicative of increased *Deepan* property, whereas enhanced FCR is indicative of *Paachan* property. Based on the available concepts, it is assumed that *Ushna Guna* is responsible for augmentation of *Deepan a* and *Paachan*,[3] and *Sheeta Guna* has the opposite effect, i.e. drugs with *Sheeta Guna* are likely to show diminished *Deepan* and *Paachan*. If the obtained data of test drugs are considered in toto, it is observed that out of the three *Ushna* drugs, two produced increase in food intake and one (Yavanee) produced decrease in food intake which was nonsignificant. The three *Sheeta* drugs, on the other hand, were found to increase the food intake. *Deepan* property is associated with an increase in appetite, but does not help in digestion.[4] The drug which possesses the *Ushna Guna*, property of *Tejamahabhoota* and also has dominancy of *Vayumahabhoota* shows *Deepan* activity.[5] The intake of food depends upon desire for it and its requirement.[6] It means that it is influenced by psychosomatic factor; appearance and smell of food is enough for stimulation of the digestive secretion. In the present study, all the drugs, except Yavanee, showed increase in food intake. This clearly is suggestive of the fact that on the basis of food consumption it would be difficult to determine whether the test drug has *Ushna* or *Sheeta* property. This issue needs further consideration of different factors. Important among them is the constitution (*Prakruti*) of the subjects (in this case, rats). Since no attempt was made to categorize them on the basis of constitution, an important aspect of Ayurvedeeya concept[7] could not be taken into consideration. The second factor is related to seasonal influence. This aspects needs to be considered in future studies. This kind of studies may be required to be undertaken in different seasons. Even within the season it has to be determined whether the study has to be undertaken in the beginning, middle or end of the season. Another important consideration is the possible change in the configuration of the drug attribute in the body after absorption, i.e. after the bio-transformation of the drugs in the body (*Paachan*).

Table 8: Effect of test drugs (*Ushna Gunayukta* drugs) on FCR in rats

Group	FCR/day (g)	
	Pre-drug[a]	Post-drug[b]
Control	05.33 ± 00.06	06.14 ± 00.37
Chitrak	06.12 ± 00.56	05.31 ± 00.34
Ativisha	06.99 ± 01.04	04.96 ± 00.14
Yavanee	05.57 ± 00.35	05.14 ± 00.36

Data: mean ± SEM; [a]5 days average (preliminary study); [b]10 days average (therapeutic study)

Table 9: Effect of test drugs (*Sheeta Gunayukta* drugs) on FCR in rats

Group	FCR/day (g)	
	Pre-drug[a]	Post-drug[b]
Control	05.33 ± 00.06	06.14 ± 00.37
Goksur	05.11 ± 00.36	05.18 ± 00.34
Musta	06.03 ± 00.49	05.50 ± 00.20
Usheer	06.00 ± 00.40	05.30 ± 00.27

Data: mean ± SEM; [a]5 days average (preliminary study); [b]10 days average (therapeutic study)

Paachan property is concerned with assimilation of digested food into body constituents. Any change in it will be reflected in the change in FCR and body weight. In the present study, drugs of *Ushna* group produced weak to moderate decrease in food conversion, indicating influence on the *Paachan* property. Among the three, Ativisha produced maximum reduction (29.04%), *Chitraka* showed 13.24% decrease and mild decrease was observed in Yavanee treated group (7.7%). Though the changes were not statistically significant, it has to be kept in mind that whereas an increase was observed in the control group, a decrease was observed in test drug administered group.

In *Sheeta Guna* group of drugs, the results were inconsistent; marginal increase was observed in *Gokshur* administered group and a marginal decrease in the remaining two groups. This is suggestive of the fact that *Paachan* may not be entirely dependent upon the *Ushna* and *Sheeta Gunas* of the drug. Other attributes may also be contributing to the observed effect. Another possibility that needs to be considered is that though the drugs have *Sheeta Guna* attribute, there may be quantitative differences.

Table 10: Effect of test drugs (*Ushna Gunayukta* drugs) on body weight in rats

Group	Body weight (g)		Actual change in body weight	(%) increase in body weight
	Initial	After drug treatment		
Control	229.83 ± 22.27	260.00 ± 27.18	30.50 ± 05.84	12.89 ± 1.61
Chitrak	208.66 ± 09.26	229.66 ± 13.21	21.00 ± 05.99	9.84 ± 2.83
Ativisha	216.33 ± 11.02	232.33 ± 41.42	19.20 ± 06.46	9.66 ± 2.88
Yavanee	226.50 ±11.98	252.33 ± 41.42	29.16 ± 04.87	12.61 ± 1.61

Data: mean ± SEM

Table 11: Effect of test drugs (*Sheeta Gunayukta* drugs) on body weight in rats

Group	Body weight (g)		Actual change in body weight	(%) change in body weight
	Initial	After drug treatment		
Control	229.83 ± 22.27	260.00 ± 27.18	30.50 ± 05.84	12.89 ± 01.61
Gokshur	220.00 ± 09.30	240.00 ± 11.54	20.00 ± 05.16	09.08 ± 02.35
Musta	205.66 ± 10.57	244.00 ± 13.75	38.33 ± 08.44	18.77 ± 04.07
Usheer	210.00 ±11.25	255.66 ± 16.12	31.00 ± 06.52	15.47 ± 03.81

Data: mean ± SEM

On the basis of the available evidence, it can be suggested that FCR may be employed to *Ushna Guna*, especially in drugs which have higher magnitude of *Ushna Guna*. However, this parameter may not be useful for the assessment of *Sheeta Guna*.

For determining the *Paachan* property along with food conversion, the body weight gain is also considered. The drug which enhances *Paachan* should produce increased rate of body weight gain in comparison to the control group, and the body weight is decreased with the drugs which diminish *Paachan*. If we analyze the result related to body weight, normal rate of body weight gain was observed in the control group. In *Ushna* group of drugs also, body weight gain was observed in comparison to initial weight. However, the magnitude of increase was lesser in comparison to the control group. In the control group, body weight gain was 12.89%, in Chitrak treated group it was 09.84%, and in Ativisha administered group it was found to be 09.66%. In Yavanee group, it was just marginally lesser than control, being 12.61%. This shows that there is some correlation between body weight gain and *Ushna* property. Similarly, the body weight gain of *Sheeta Guna* drugs in Musta administered group was 18.77% and in Usheer administered group it was 15.47% (this is higher than the control group). This again shows that *Sheeta Guna* drugs may be promoting body weight gain. In Gokshur administered group, the body weight gain was less, being 9.08% only. It is to be pointed out here that the magnitude of *Sheeta Guna* is highest in Musta and comparatively lesser in Gokshur; hence, the observed difference in the body weight may be indicative of difference in the intensity in *Sheeta Guna*.

Based on the above, it can be suggested that though individual parameters in the *Deepan* and *Paachan* study did not consistently reflect the influence of either *Sheeta* or *Ushna Guna*, measurement of body weight can have utility after further refinement. Keeping the influence of season of study and feeding state of the animals in mind, if the experiments are designed and studied using only the drugs possessing higher magnitude of *Ushna* and *Sheeta* property, it may be possible to standardize a protocol to determine the *Gunas*. The basic assumption has to be that in the animals with proper nourishment, *Ushna Guna* drugs would decrease the rate of body weight gain and drugs with *Sheeta Guna* would increase the rate of body weight gain in comparison to control animals without receiving any medication. Such experiments have to be carried out in different seasons so that it could be possible to select the proper time for the study where in the influence of the *Guna* is likely to be maximum.

Water intake

There was no uniformity in the observed effects and hence no general categorization could be done based on *Ushna* and *Sheeta Gunas*.

Conclusion

Out of the five parameters analyzed in the pharmacological study, change in body weight is to be considered to a large extent as a parameter for assessment of *Ushna* and *Sheeta Gunas*. Though some of the parameters could not provide satisfactory results, still *Deepan–Paachan* is suggested as a possible parameter. Absolute evolution of one *Guna* is not possible in living body as infinite factors are related with every biological event. This may be a major cause behind unsatisfactory results of pharmacological studies.

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हिन्दी सारांश

उष्ण एवं शीत गुण के परिपेक्ष्य में प्रायोगिक अध्ययन पर आधारित मापदंडो का विकास

संतोष माने, महेश व्यास, बी. रविशंकर, आर. आर. द्विवेदी

सिद्धान्त प्रस्थापनार्थ आयुर्वेदीय शास्त्र में गुणों की चिकित्सकीय उपादेयता सर्वत्र वर्णित है किन्तु अधिकतर द्रव्य का ही उपयोग किया जाता हैं। गुणों का नैदानिक एवं चिकित्सात्मक महत्त्व प्रायोगिक अध्ययन द्वारा स्थापित करना समय की मांग है । इस अध्ययन में यह प्रयास उष्ण एवं शीत गुणों के संदर्भ में एवं अम्लपित्त व्याधिकी दो विभिन्नावस्थाओंमें किया गया। चिकित्सामें द्रव्य करण हैं अतः उष्ण द्रव्यों के अंतर्गत श्वेत चित्रक, अतिविषा तथा यवानी एवं शीत द्रव्यों के अंतर्गत गोक्षुर, मुस्ता तथा उशीर का चयन किया गया। उपरोक्त द्रव्योंमें से उष्ण द्रव्यों का प्रयोग शीत गुण वृद्धियुक्त अम्लपित्त के ९४ रुग्णों में एवं शीत द्रव्योंका उष्ण गुण वृद्धियुक्त अम्लपित्त के ९१ रुग्णों में किया गया। कुल १८५ रुग्णों में किये गये चिकित्सकीय अनुसंधान के पश्चात प्राप्त हुये निष्कर्ष गुणोंका चिकित्सामें महत्त्व स्थापित करते हैं।