



Research Article

APPLICATION OF *KARYA-KARANA VADA*: A CASE-CONTROL STUDY REGARDING *LAVANARASA ATIIYOGA*

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ABSTRACT

The concepts of philosophical science and Ayurveda are symmetrical to some extent, but due to difference in purpose these are elaborated in different way. According to *Karya-Karana vada* every cause has an effect. The Ayurveda search causes of health as well as diseased conditions. *Lavanarasa* (salty taste) is one of the principal organoleptic units in food, which always provokes the consumer to consider it but its exorbitant intake in diet produces some symptoms. So far now many studies have been done with relation to *Rasas* (tastes) but no significant results obtained. Keeping this in mind a case-control study was performed where in 182 volunteers were interviewed personally to evaluate relationship between cause (*Atisevana* of *Lavanarasa*) and effective symptoms such as *Raktavridhi* (hypertension), *Vali* (wrinkles), *Palitya* (greying of hairs), *Khalitya* (hair fall), *Vicharchika* (eczema), *Trishna* (thirst), *Shotha* (joint inflammation), *Daurbalya* (weakness). Subjects with these particular symptoms are included in study as cases while healthy ones are considered as controls. To measure the abundant use of salty taste quantity and frequency of common dietary processed food articles such as salty biscuits, potato chips, butter cheese, pickles, soups, papads (thin wafers) and some natural foods like milk, eggs and ham meat are taken into account. Data was obtained and statistical test odds ratio applied to derive relation between cause and effect. Present study shows that salty taste has strong association for hypertension and very mild relation for eczema and moderate association with rest of the symptoms which itself proves the law *Karya-karana vada* expressed in terms of *Atiyoga* of *Lavanarasa* and its repercussions.

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INTRODUCTION

Ayurveda considers the fact that whatever exists in nature has cause and nothing will exist without cause^[1]. Eternal things need not have cause; these things are existent and are devoid of any cause^[2]. The *Trisutra Ayurveda* is the chief theme of Ayurveda which explains *Hetu* (causes), *Linga* (symptoms) and *Aushadha* (treatment)^[3]. But one can perfectly diagnose a disease in Ayurveda only if he knows the exact relationship between *Hetu* and *Linga* i.e. *Karya-karana vada* (cause and effect relationship). There are so many factors which affect an individual's food acceptance of which palatability plays an important role for making choice of food. Consumption of food depends on pleasantness of each taste (*Rasa*)^[4]. As palatability of salty (*Lavana rasa*) and spicy (pungent) taste is common it is observed that intake of fast food, which is predominantly salty and spicy among the people is very high. *Lavana rasa* (salty taste) is one of the main

organoleptic units in food, which always provokes the consumer to take it frequently, the fact can be noticed in the classical text of *Ayurveda* "*lavanam annadravya ruchikaranam*" (salt improves the flavour of food). Our ancient Indian literature study reveals the importance of consumption of *Shadarasatmak aahar* (food having six tastes) i.e. *Madhur* (sweet), *Amla* (sour), *Lavana* (salty), *Katu* (pungent), *Tikta* (bitter), *Kashaya* (astringent) in equilibrium way and excess use of any of the *rasa* (taste) shows unfavourable effect on the body^[5]. Uniform use of *Lavanarasa* in the diet stimulates *Pachana* (digestion), provides *Kledana* (moistening), *Chyavana* (scrapping), *Chedana* (excision) effect to food. It has property *Bhedana* (breaking down), *Tikshna* (piercing sharp) and *Sara* (initiates movements). It balances *Vata*. *Lavana rasa* (salty taste) breaks down *Sthambha* (stiffness), *Bandha* (bonds) and *Sanghata* (obstruction). It is known as

Sarvarasa pratyantikabhuta (can dominate all other tastes). Its functions are *Aasyamasravayati* (salivation), *Kapham vishyandayati* (liquefies *Kapha*), *Margan vishodhayati* (cleaning and clearing body channels), *Sarvashareera avayava mrudukaroti* (softens all body parts), *Rochayati aaharam* (Improves taste of food). It is not too *guru* (heavy), not too *Ushna* (hot) and not *Snigdha* (oily)^[5]. However its overuse shows some signs and symptoms such as *Pittam kopayati* (vitiation of *Pitta*), *Raktam vardhayati* (hypertension), *Tarshayati* (excess thirst) *Murchayati* (fainting) *Tapayati* (heating sensation) *Darayati* (erosion) *Kushnati Mamsani* (depletion of muscle tissue), *Visham vardhayati* (aggravates poison effects), *Shophan sphotayati* (opens up swellings), *Dantan chyavayati* (teeth dislodgement), *Pumstvam upahanti* (impotency). *Indriyani uparunaddhi* (obstructions in the functions of sense organs), *Vali* (wrinkles), *Khalitya* (graying of hair), *Palitya* (hair fall), *Visarpa* (erysipelas), *Vatarakta* (gout), *Vicharchika* (eczema) and *Indralupta* (alopecia). *Acharya vagbhata* also explained same symptoms of overuse of *Lavana rasa*^[6].

During interrogating the volunteers it is noticed that *Lavanarasa* predominant food articles are consumed in their diet or *add on* salt method is adopted to raise pleasantness in food articles. In spite of this until date no study has been undertaken to find the relation between overuse of *Lavanarasa* (salty taste) dominant diet and the symptoms produced by it. Furthermore a case-control survey study was adopted to search out correlation between these two variables. Of all signs and symptoms given in classical texts such symptoms like *Raktavridhhi* (hypertension), *Vali* (wrinkles), *Palitya* (graying of hairs), *Vicharchika* (eczema), *Khalitya* (hair fall), *Shopha* (joint inflammation) were selected to warrant the classical claim. Therefore the present study which could be applicable while recommending diet to encourage health and treat diseases conditions were adopted to evaluate the association between overuse of *Lavanarasa* (salty) diet and symptoms generated by it.

MATERIALS AND METHODS

A population based case-control study was performed in residential areas of Udgir city of Maharashtra, India. It took six months for completion of present survey study

Cases

The volunteers who have symptoms of interest i.e. Hypertension or Wrinkles or Greying of hairs or Hair fall or Eczema or Thirst or Joint inflammation or Weakness.

Controls

The volunteers free from above symptoms were being compared with cases.

The volunteers who are suffering from above symptoms are clinically diagnosed at study centres and then selected. To gather a control series for particular case series neighbours, colleagues of these cases were interviewed. Open-ended questionnaire in both Marathi and English was prepared especially for survey study.

Sampling method

Suitable sampling method, by which *Lavana rasa* exposed volunteers can be traced easily was applied for the study.

Consumers at fast food centres, lunch house, cafeteria, hostel students who are more prone to exposure of salty taste food articles like sauces, ketchups, butter cheese, pickles, salted nuts, instant soups, eggs, potato chips, pizza, canned vegetables, fast foods etc. of either sex belonging to age group of 15-50 years were personally interviewed. Taking the *Lavanarasa atiyoga* (overuse of salty diet) into consideration, participants with high intake of salty diets for long period were considered under exposed group and participants with balanced normal intake were put under unexposed group.

Designing of proforma

To calculate the exorbitant consumption of *Lavana rasa* a primary proforma was made based on the use of *Lavana rasa* dominant food articles consumption routinely in local population. [Table 1]

In local population of Udgir city salt dominant natural food articles such as eggs, milk, cheese butter, papads, salted nuts, breads, pickles, ham meat, salted chips, salty laxatives, farsan chivada, dressed salads, canned soups, ketchups, sauces are used in routine diet abundantly and frequently. Intake of each food article by population was recorded and classified such as normal consumption and excess consumption. For instance, intake of a pickle more than 2 pieces per day in various preparations for more than one month in last one year was considered as excess consumption of *Lavana rasa* (salty taste) and these subjects were ultimately categorized under exposed group (*Lavana rasa Atiyoga* group) while those who consumed salty taste below this estimated level of pickle were categorized under unexposed group. Like pickle, quantification of exorbitant use for each salty food article was also counted.

Table 1: Primary proforma to assess use of salty taste

Salty taste predominant food articles	Occasionally / seasonal / routine	Duration	ml./mg./no./week	Upper limit for normal consumption (min. for 1 month)	Atiyoga Yes/No
Cheese butter			400 gm/week		
Milk			5 L / week		
Papad			10 pieces /week		
Salted nuts			1 Kg/week		
Eggs			24 eggs/ week		
Breads			90 slices/ week		
Pickles			28 pieces/ week		
Ham meat			2 Kg/week		
Salted chips			1.5 Kg/week		
Salty laxatives			200 gm/week		
Farsan chivada			2.5 Kg/week		
Dressed salads			2.5 Kg/week		

Statistical analysis

After collection of data, it was presented in 2x2 tables for each symptom. The odds ratio for each symptom was analysed to estimate the risk for a symptom in relation to a given risk factor (*Lavana rasa atiyoga*). Confidence interval (CI) [95%] was also analysed to observe whether the data was statistically significant or not.

Result

A total of 182 volunteers were interviewed for the survey study. Volunteers with excess intake of *Lavana rasa* were distributed with regard to age and gender. Odds ratio with CI 95% was calculated accordingly regarding to age group, the odds ratio was 1.60, 1.83 and 1.86 in young, middle and old aged subjects respectively which shows positive association between *Atiyoga* of *Lavana rasa* (salty taste) as age progresses [Table 2]. No difference in odds ratio was observed in both male and female which indicates that there is no relationship between *Atiyoga* of *Lavana rasa* and gender.

Table 2: Distribution of cases and excess use of salty taste in view of age and gender

Age and Gender group	Total subjects with excess use	Positive cases of excess use	Participants with balanced use	Positive cases with balanced use	Odds Ratio	Confidence interval
Age						
15 - 30 (young)	41	29	59	26	1.60	0.82 - 3.11
30-45 (mid age)	23	16	29	11	1.83	0.71 - 4.70
45-60 (old age)	13	10	17	7	1.86	0.55 - 6.23
Gender						
Male	38	26	56	24	1.59	0.79 - 3.18
Female	35	23	53	20	1.74	0.83 - 3.63

Cases and control of each symptom according to exposure of excess salty taste are distributed [Table 3]

Table 3: Symptom wise distribution of cases & controls and estimate of OR (odds ratio)

Symptoms	Groups	Exposed	Unexposed	OR	CI
Hypertension	Cases	22	9	4.03	1.73 - 9.36
	Controls	57	94		
Skin Wrinkles	Cases	32	18	1.94	0.99 - 3.80
	Controls	63	69		
Greying of hairs	Cases	25	26	1.90	0.98 - 3.67
	Controls	44	87		
Hair fall	Cases	19	8	2.59	1.07 - 6.29
	Controls	74	81		
Eczema	Cases	14	19	0.95	0.44 - 2.04
	Controls	65	84		
Thirst	Cases	20	09	2.37	1.01 - 5.54
	Controls	74	79		
Joint inflammation	Cases	27	26	2.68	1.38 - 5.20
	Controls	36	93		
Weakness	Cases	10	12	1.09	0.44 - 2.69
	Controls	69	91		

CI: Confidence interval

The odds ratio 4.03 for hypertension, which is calculated on the basis of number of exposed and unexposed subjects in case and control group, shows strong association of hypertension with excess use of *Lavana rasa*. The 95% confidence interval (CI) 1.73 to 9.36 indicates that odds of hypertension cases are significantly higher for *Lavanarasa atiyoga* because it does not contain numeral 1.

The 1.94 odds ratio for skin wrinkles calculated based on number of exposed and unexposed subjects indicates increased chances of wrinkles on skin in people consuming salty taste in exorbitant amount. The CI (0.99 - 3.8) indicates that odds of skin wrinkles cases are not significantly higher for *Lavana rasa Atisevana* group at 95% significance level because the CI contains numeral 1.

The odds ratio for greying of hairs is 1.90 indicating fair chances of hair greying in people consuming *Lavana rasa* in excess. The CI (0.98 - 3.67) indicates data not significant up to 0.05 level because CI contains 1.

Odds ratio (2.59) regarding hair fall for the exposed group compared with unexposed group shows moderate positive association between exposure (excess salty intake) and outcome (hair fall). CI (1.07 - 6.29) at 95% level also indicates result is statistically significant because it's not containing numeral 1.

0.95 odds ratio and 0.44 - 2.04 CI at 0.05 level for eczema indicate no significant association between exorbitant consumption of salty taste and eczema.

Odds ratio (2.37) regarding thirst for the exposed group compared with unexposed group indicates moderate positive association between exposure and outcome. CI (1.01 - 5.54) at 95% level also indicates that result is statistically significant because it is beyond 1.

For joint inflammation there was moderate association between intakes of *Lavana rasa* and its outcome joint inflammation as at the 95% CI the odds ratio was found 2.68 and CI (1.38 - 5.2) which does not contain 1.

The odds ratio 1.09 for weakness compared between exposed and unexposed group indicates very mild positive association. CI (0.44 - 2.69) at 95% level also indicates result is not significant.

DISCUSSION

The theory of *Karya-karana vada* in relation to *Lavana rasa Atiyoga* and its repercussions is proved to some extent here which is clear from statistical analysis. The association between *Karana* and *Karya* is assessed in this study. The present documentation also witnesses the worthiness of Ayurveda classical literature. Basic principles in Ayurveda texts also reveals that result of specific *rasa* (taste) is ultimately the effect of that *Dravya* (substance) which imitates and acts in accordance with the *Rasas* as *Dravya* is the

habitat of that specific *rasa*^[7]. This is due to close association between the two. Hence outcome of exorbitant *Lavana rasa* predominant *Dravyas*. In Ayurveda science there is lack of particular quantifying method for assessment of *Atiyoga* of *Rasa*, but here in this case the word '*Atiyoga*' (excess consumption of salty taste) can be considered as either in high dose or for long period. In this study, the notion '*Atiyoga*' was assumed as abundant dose for long period and based on this intake of each salty food item daily was calculated. Investigation of quotidian salty diet intake pattern was done and eventually balanced and abundant use of *Lavanarasa* was determined. Though case-control studies are less costly, less time consuming and advantageous when exposure data is difficult to obtain but these studies are specifically prone to definite biases and confusion^[8]. Hence it was necessary to overcome these restrictions. Another obstacle which can create error is selection bias, so while selecting a study population, controls must represent cases as well as general population in terms of their chance of exposure. If the controls are artificially more like the cases, then results will underestimate the true odds ratio. If the controls are artificially less like the cases, then resulting odds ratio will be overestimated^[9]. Here selection bias is minimized by selecting neighbourhood controls.

22 Participants who revealed hypertension ingest more salty taste food articles like butter cheese, salted nuts, ham meat, pickles regularly. Even though the physiology of salt intake in the development of hypertension is complex, animal studies indicate that hypertension increases with increasing dietary salt. Multiple species of animals such as mice, rats, rabbits, dogs, pigs and chimpanzees have an increase in Blood pressure when provided high sodium diets^[10]. Hence it suggests that *Lavana rasa* is one of the main associates with hypertension.

Hair fall is common embarrassing problem for many people. Fast oxidizers have elevated sodium levels. Sodium is eliminated in part through the skin and hair. The first inch or two of the hair represents section of active growth where minerals can be stored and called up on during stressful periods. As sodium accumulates in the tissue, it can petrify the hair follicle resulting in hair loss^[11]. However *Lavana rasa* dominant diet may associate with hair fall but pathology of it is not established till date.

Salt intake exacerbates any inflammatory condition such as arthritis, as your blood vessels expand. Swollen veins and arteries associated with high salt intake may place uncomfortable pressure on the surrounding joints. According to arthritis foundation corticosteroids commonly used to treat rheumatoid arthritis cause you to retain sodium, so any extra salt you get from your diet may aggravate arthritis^[12]. Hence joint inflammation may be increased by *Lavana rasa* dominant diet.

CONCLUSION

Present study revalidates the repercussions mentioned in Ayurveda classical literature regarding exorbitant use of *Lavana rasa* might be a risk factor for Hypertension, Hair fall, greying of hairs, skin wrinkles, frequent thirst episodes and joint inflammation. Positive association between such type of symptoms and age shows that decrease in palatability of *Lavana rasa* as age progresses. Present study opens a new window in the field of research for identification of effects of excess use of *Lavana rasa* regarding seasonal and dwelling variation.

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