

# Consequences of *Madhurarasa Atiyoga*: A Case–Control Study

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## ABSTRACT

**Introduction:** According to classical *Ayurvedic* texts, balanced intake of *madhurarasa* in diet helps to maintain physiological health, but its excessive intake produces some signs and symptoms, such as *Sthoulya*, *Aalasya*, *Nidradhikya*, *Anannabhilasha*, *Agnimandya*, *Anaha*, *Galaganda*, *Gandamala*, *Gala Shophya*, and *Asyamadhurya*.

**Aims and objectives:** To establish the relationship between excessive use of *madhurarasa* and signs/symptoms produced by it.

**Materials and methods:** A case–control survey study was planned wherein totally 356 volunteers were interviewed personally. Subjects with particular symptoms were considered as a case, while healthy volunteers were considered as controls. To measure the excessive intake of *madhurarasa*, the quantity and frequency of common food items, such as dairy products, corn, pasta, starchy vegetables, cream, wheat, rice, sweet potatoes, banana, and dates are taken into consideration. Data were arranged in a 2 × 2 table and odds ratio (OR) was calculated for each symptom.

**Results:** Odds ratio for *Sthoulya*, *Aalasya*, *Nidradhikya*, *Anannabhilasha*, *Agnimandya*, *Anaha*, *Gala Shophya*, and *Asyamadhurya* with 95% confidence interval (CI) was found to be 1.92 (1.17–3.1), 1.28 (0.68–2.45), 1.89 (1.03–3.47), 1.32 (0.70–2.47), 1.82 (1.13–2.96), 1.93 (1.09–3.44), 2 (1.16–3.45), and 1.93 (1.18–3.14) respectively.

**Conclusion:** From the above-obtained results, it is concluded that *madhurarasa* is a risk factor for *Sthoulya*, *Nidradhikya*, *Agnimandya*, *Anaha*, *Galashophya*, and *Asyamadhurya*. The study supports the *Ayurvedic* classical claim regarding *atiyoga* of *madhurarasa*.

**Keywords:** *Karya-karana vada*, *Madhurarasa*, Risk factor.

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## INTRODUCTION

The *Ayurvedic* science of healing is weaved around the concept of *rasa* or taste, which determines the influence of various foods on the human body. All foods are classified into six *rasas*, viz., *madhura*, *amla*, *lavana*, *katu*, *tikta*, and *kashaya*.<sup>1</sup> A balanced diet includes a healthy combination of all *rasa* and harmonizes physical and emotional health. Dominance of a particular *rasa* in meals can result in imbalance of *dosha*.<sup>2</sup>

*Ayurveda* searches for the causes of health as well as diseased conditions. Palatability is a significant factor for preference of food by an individual. *Madhurarasa* is one of the major organoleptic entities in foods of the present day, which always tempts the consumer to consume it immediately. Being *guru*, *snigdha*, and *sheeta guna*, *madhurarasa* has the ability to promote longevity and strengthen body tissues. *Madhurarasa* has the dominance of *prithvi* and *aap mahabhuta* in its formation or composition. Many dietary articles containing *madhurarasa* include milk and milk products (butter, ghee, and cream), grains (especially rice, wheat, and barley), many legumes (beans and lentils), sweet fruits (bananas, mangos, dates, etc.), and certain cooked vegetables (carrots, sweet potatoes, and beets).

As this *rasa* is formed by the dominance of *prithvi* and *aap mahabhuta*, it shows their characteristics mainly in *samyakayoga*. Physiologically, *madhurarasa* performs following functions: *Saptadhatuwardhana*; *Jeevana* or *Ayushya*; *Shadindriyaprasadana*; *Balavarnyakara*; *Trishna-Dahaprashamana*; *Tvachya*; *Keshya*; *Kanthy*; *Prinana*; *Tarpana*; *Bruhana*; *Sthairyakara*, *Kshinkshatsandhanakara*, *Ghrana-Mukha-Kanthaushtha-Jihvapralhadana*, and *Murchhaprashamana Karma*.<sup>3</sup> Diseases are the mirror images of the excess or low quantities of food consumed by human beings. According to *Karya Karana Vada*, every cause has an effect. That is why even though *madhurarasa* possesses valuable properties, when used in excess in isolation, it causes vitiation of *Kapha* that results in *Sthoulya*, *Aalasya*, *Nidradhikya*, *Anannabhilasha*, *Agnimandya*, *Anaha*, *Galaganda*, *Gandamala*, *Galashophya* and *Asyamadhurya*, *Galopalepa*, *Shvasa*, *Kasa*, and *Shlipada*.<sup>4</sup>

In this study, during history taking of the patient, it was observed that *madhurarasa*-dominant *Ahara* was being consumed in their diet. However, the relationship between excessive use of *madhurarasa* and *Ahara*

and the disease conditions related to it has not been validated until date. Thus, a case–control survey study was conducted to trace the relationship between these two variables. Among signs/symptoms mentioned by the classics, symptoms, such as *Sthoulya*, *Aalasya*, *Nidradhikya*, *Anannabhilasha*, *Agnimandya*, *Anaha*, *Galashopha*, and *Asyamadhurya* were selected to justify the classical claims. Hence, participants who have particular symptoms were considered as a case for that symptom. To find out the cause and effect relationship between excessive use of *madhurarasa* and sign/symptoms produced by it and also to create an awareness in the current population regarding excessive use of *madhurarasa*, this study has been undertaken.

## AIMS AND OBJECTIVES

To establish the relationship between excessive use of *madhurarasatmaka ahara* and signs/symptoms produced by it and also to create awareness in the current population regarding excessive use of *madhurarasa*.

## MATERIALS AND METHODS

A population (of cases)-based case–control study was conducted in the residential area of Jaipur, Rajasthan (India).

### Cases

The participants of either gender, belonging to the age group of 15 to 60 years, who have symptoms of *madhurarasa Atiyoga* as mentioned in the classics, i.e., *Sthoulya*, *Aalasya*, *Nidradhikya*, *Anannabhilasha*, *Agnimandya*, *Anaha*, *Galashopha*, and *Asyamadhurya*, were considered as cases. *Sthoulya* was assessed with the help of the height–weight chart and all who were showing various *Lakshana* of *Sthoulya*<sup>5</sup> mentioned in *Charaka* were considered as *Sthula*. *Aalasya*, *Nidradhikya*, *Anaha* (*Aamaja*), *Anannabhilasha*, *Asyamadhurya*, etc., were subjective criteria. Hence, the grades of 0 and 1 were used to observe these *Lakshanas*.<sup>6</sup> *Galashopha* was assessed by *Lakshana* “*Gale Utsedhamatram Galashundyadikam Na Tu Galaganda*”<sup>7</sup> as commented by *Gangadhara* in the *Jalpakaipataru* commentary. The pathological investigations, i.e., thyroid profile, ultrasonography of the neck, were done when needed to exclude the other causes for *Galashopha*. *Agnimandya* were assessed by *Abhyavaharanashakti* and *Jaranashakti*.<sup>8</sup>

### Controls

The participants of either gender belonging to the age group of 15 to 60 years who were not suffering from the above symptoms, i.e., *Sthoulya*, *Aalasya*, *Nidradhikya*, *Anannabhilasha*, *Agnimandya*, *Anaha*, *Galashopha*, and

*Asyamadhurya* were being compared with cases. To assemble a control series for particular cases series, the neighbor/colleague of these cases were interviewed.

## Sampling Method

Convenience sampling method through which *madhurarasa*-exposed persons can be traced easily was applied for the study. Consumers at bakery product shops, restaurants, dairy house, fruit shops, and hostel students of the institution, who are more prone to exposure of *madhurarasatmaka ahara*, such as dairy products, corn, pasta, starchy vegetables, cream, wheat, rice, sweet potatoes, banana, dates, etc., were personally interviewed and divided into exposed and unexposed groups. Participants with excessive intake of *madhurarasatmaka Ahara* were considered as the exposed group and participants with normal intake were considered under unexposed group.

## Preparation of Proforma

To gauge the excessive ingestion of *madhurarasa*, screening of the local population was done based on specially prepared questionnaires on the consumption of *madhurarasatmaka Ahara* routinely (Table 1). The questionnaire of survey proforma was open-ended and designed in both Rajasthani and English language. In the survey study, it was observed that the local population of Jaipur were frequently taking *madhurarasatmaka Ahara*, such as milk and dairy products, corn, pasta, starchy vegetables, cream, wheat, rice, sweet potatoes, banana, and dates in excessive quantities. The quantity of each sweet food item was recorded and categorized into normal intake and excessive intake, such as monitoring the intake of buffalo milk of more than 2 glasses/day for more than a month in the last 1 year was considered as excess intake of the sweet food. In *madhurarasa Atiyog* group (exposed group), those participants who consumed excess of the *madhurarasatmaka Ahara* ultimately were categorized as exposed group, while those who consumed sweet-tasting foods below this estimated level were categorized under unexposed group. Likewise, the quantification of *madhurarasatmaka Ahara*, viz., dairy products, corn, pasta, starchy vegetables, cream, wheat, rice, sweet potatoes, banana, and dates, was also done.

## Statistical Analysis

For each symptom, i.e., *Sthoulya*, *Aalasya*, *Nidradhikya*, *Anannabhilasha*, *Agnimandya*, *Anaha*, *Galashopha*, and *Asyamadhurya*, data were presented in a 2 × 2 table. The OR was analyzed to estimate the relative risk of a symptom for the excessive use of *madhurarasa*; 95% CI was also analyzed to observe whether that data were statistically significant.

**Table 1:** Prepared primary proforma to evaluate excessive use of sweet taste

Madhurarasa predominant food articles	Occasionally/seasonal routine	Duration	MI/mg/no./week	Upper limit for normal consumption (minimum for 1 month)	Atiyoga yes/no
Buffalo's milk				5 L/week	
Dairy products				3 L/week	
Cream				50 gm/week	
Corn				16 pieces/week	
Food item of wheat and rice				10 kg/week	
Sweet potatoes				4 kg/week	
Banana				3 kg/week	
Dates				2 kg/week	

**Table 2:** Distribution of cases and overuse of madhurarasa with respect to age and gender

Age (years) and gender groups	Total subjects with overuse	Positive cases of overuse	Total subjects with balanced diet	Positive cases with balanced use	OR	CI
15–30 (young)	88	60	122	56	0.6732	0.4267–1.062
31–45 (middle)	52	24	40	24	1.300	0.6454–2.618
46–60 (old)	39	18	15	14	2.022	0.8075–5.064
Male	68	44	110	50	0.7025	0.4237–1.165
Female	88	50	90	40	0.7822	0.4701–1.302

**Table 3:** Distribution of cases and controls for individual symptoms and estimates of OR

Symptoms	Groups	Exposed	Unexposed	OR	95% CI
Sthoulya	Cases	44	41	1.925	1.17–3.1
	Controls	97	174		
Aalasya	Cases	20	24	1.28	0.68–2.45
	Controls	122	190		
Nidradhikya	Cases	25	24	1.89	1.031–3.472
	Controls	109	198		
Anannabhilasha	Cases	20	26	1.323	0.7064–2.476
	Controls	114	196		
Agnimandya	Cases	46	45	1.829	1.130–2.961
	Controls	95	170		
Aanaha	Cases	30	26	1.93	1.090–3.442
	Controls	112	188		
Galashopha	Cases	35	30	2.006	1.166–3.453
	Controls	107	184		
Aasyamadhurya	Cases	45	42	1.931	1.184–3.149
	Controls	96	173		

## RESULTS

For this survey study, totally 356 participants were interviewed. Participants with excessive intake of madhurarasa were distributed with regard to age and gender (Table 2). According to the age group, OR with 95% CI were calculated and found to be 0.6732, 1.300, and 2.022 in young-, middle-, and old-aged participants respectively. This shows a positive association between madhurarasa Atiyoga and age. The values may be due to a decrease in the tolerability toward sweet-tasting foods as age progresses. No difference in the OR was observed between males and females, which indicates that there is no relationship between Atiyoga of madhurarasa and gender. Cases and controls of each symptom according to exposure of excess madhurarasa are shown in Table 3.

The OR of 1.92 for Sthoulya, which is calculated based on the number of exposed and unexposed subjects in the case and control groups, shows a strong association of Sthoulya with excess use of madhurarasa. The 95% CI of 1.17 to 3.1 indicates that the ORs of Sthoulya cases are significantly higher for madhurarasa Atiyoga because they do not contain the numeral 1.

The OR of 1.28 for Aalasya, calculated based on number of exposed and unexposed subjects, and CI (0.68–2.45) indicate that OR of Aalasya cases is not significantly higher for madhurarasa Atisevana group at 95% significance level because the CI contains numeral 1.

The OR for excessive Nidradhikya is 1.89 and this shows a strong association of excessive sleepiness with excess use of madhurarasa. The 95% CI of 1.03 to 3.47 indicates that the OR of Nidradhikya cases is significantly

higher for *madhurarasa Atiyoga* because it does not contain numeral 1.

Odds ratio (1.32) regarding anorexia shows fair chances of *Anannabhilasha* in people consuming *madhurarasa* in excess. The CI (0.70–2.47) indicates that data are not significant up to the 0.05 level because CI contains 1.

The 1.82 OR and 1.13 to 2.96 CI at 0.05 level for *Agnimandya* indicate significant association between exorbitant intake of *madhurarasa* and *Agnimandya*.

Odds ratio (1.93) regarding *Aanaha* for the exposed group compared with unexposed group indicates moderate positive association between exposure and outcome. The CI (1.09–3.44) at 95% level also indicates that the result is statistically significant because it is beyond 1.

For *Galashopha*, there was a moderate association between intake of *madhurarasa* and *Galashopha* as at the 95% CI, the OR was found to be 2 and CI (1.16–3.45) does not contain 1.

The 1.93 OR and 1.18 to 3.14 CI at 0.05 level for *Aasyamadhurya* indicate significant association between excessive intake of *madhurarasa* and *Aasyamadhurya*.

## DISCUSSION

In *Ayurveda*, *Karana* (cause) is defined as that which produces the *Karya* (effect). There is no effect without cause; both cause and effect are closely related. According to the concept of the disease formation, *Nidana* (cause) is the main culprit of many diseases. *Ayurveda* attaches greater importance to *Nidanas* and describes them in detail as causes of diseases. This is mainly intended so as to focus on the attention of the physician and layman also.

The theory of cause and effect relation with regard to *madhurarasa Atiyoga* and its repercussions has been proved to some extent here, which is clear from the statistical analysis. The association between *Karana* and *Karya* is assessed in this study. The physiological and pathological effects of *Rasa* (taste) are mentioned in *Charaka Samhita* and other *Ayurvedic* classical texts.<sup>9-11</sup> This is a unique concept of *Ayurveda*. Classical texts also opine that the effect of a particular *Rasa* is indirectly the effect of a *Dravya*, which is the abode of that particular *Rasa*.<sup>12</sup> So here, the effect of *madhurarasa Atiyoga* (excessive intake of sweet taste) should be understood as *Atiyoga* of *madhurarasa Ahara* (excessive intake of food articles having sweet taste).

In *Ayurveda* science, there is no quantifying method for assessment of *Atiyoga* of *Rasa*, but the term *Atiyoga* (excess intake) can be gauged in two ways, i.e., in high quantity and/or for longer duration. In this survey study, the concept of *Atiyoga* was considered as the higher dose for longer duration and then consumption

of each sweet food item routinely used was measured. Many people were asked about the routinely consumed sweet item's uptake pattern and after that the normal and excessive use of it was determined. Further to this, it was discussed with the faculty of the institute and then finalized.

Totally, 44 participants, who were revealed as obese, ingested *madhurarasa Ahara*, such as milk and dairy products, corn, pasta, cream, rice, banana, and dates regularly. It is no surprise that consuming too much of *madhura Ahara* can lead one to gain weight. Excess of sugar to the body not immediately required for energy can easily be converted to triglycerides, a type of fat that can then be stored around the waist as well as in the hips and thighs. Sugary beverages, such as soft drinks and fruit-flavored punches, are the worst offenders because the calories in the liquids do not influence satiety and can even lead to a person craving for more. With time, many studies have validated the association between sugar, especially in beverages, and obesity.<sup>13</sup> Hence, it is suggested that *madhurarasa* is one of the main associates of obesity (*Sthoulya*).

In the case of *Nidradhikya*, *Nidra* is due to the dominance of *Tamaguna*, *Shleshma*, and *Mana*. Due to the aggravation of *Kapha*, *Nidradhikya* is present in which the person always feels sleepy. This is due to the aggravated *Guru-Manda Guna* of *Kapha*. *Madhurarasa*, if consumed in excess, causes *Atisvapna*.

Regarding *Agnimandya*, *madhurarasa* is the *Guru* and *Snigdha* of all the tastes and its excessive use leads to vitiation of *Agni*,<sup>14</sup> which is the root cause of every disease. *Agni* is responsible for biotransformation of different materials. So, vitiation of *Jatharagni* leads to vitiation of *Dhatvagni* and *Bhutagni*. This vitiated *Jatharagni* does not digest even the lightest of food substances, resulting in indigestion and *Ama* formation. This *Ama* formation is also responsible for *Aanaha* (*Aamaja*).<sup>15</sup> In *Aamaja Aanaha*, the digestion process slows down, making the stomach bloated. In *Aasyamadhurya*, *madhurarasa* coats the tongue as it is *Pichchila*. It is termed as *Upalepa*. *Kapha* has *madhurarasa* in *Niramavastha*. Thus, *Atiyoga* of it creates a constant feeling of *madhurarasa* in the mouth. *Bodhaka Kapha* is present in the mouth cavity, which is responsible for it. *Galashopha* shows a positive association between excessive use of *madhurarasa* and these symptoms. *Guru-Manda-Sheeta Guna* of *Kapha* creates this *Lakshana*.

## CONCLUSION

The present study revalidates the repercussions mentioned in *Ayurveda* classical literature regarding excessive use of *madhurarasa*, which might be a risk factor for *Sthoulya*, *Agnimandya*, *Nidradhikya*, *Anaha*, *Aasyamadhurya*, and

*Galashopha*. A positive association between such types of symptoms and age shows a decrease in palatability of *madhurarasa* as age progresses. This study supports the *Ayurvedic* classical claim regarding the excessive use of *madhurarasa* and symptoms produced by it.

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आयुष  
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## हिंदी सारांश

### मधुर रस अतियोग के परिणाम: एक केस-कन्ट्रोल अध्ययन

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शास्त्रीय आयुर्वेदिक ग्रंथों के अनुसार, आहार में मधुर रस की संतुलित मात्रा का सेवन शारीरिक स्वास्थ्य को बनाए रखने में मदद करता है, लेकिन इसके अत्यधिक सेवन से स्थौल्य, आलस्य, निद्राधिक्य, अनन्मभिलाषा, अग्निमांद्य, आनाह, गलगण्ड, गण्डमाला, गलशोफ और आस्यमाधुर्य इत्यादि लक्षण उत्पन्न होते हैं। इसी उद्देश्य को लेकर मधुर आहार और उसके अत्यधिक उपयोग से उत्पन्न लक्षणों के बीच संबंध स्थापित करने के लिए एक प्रयास किया गया। उसके लिये एक केस कन्ट्रोल सर्वेक्षण अध्ययन डिजाइन किया गया था जिसमें कुल 356 इच्छुक प्रतिभागियों से व्यक्तिगत रूप से बातचीत की गई, जिसमें विशेष लक्षणों के साथ प्रतिभागियों को केस के रूप में, जबकि स्वस्थ प्रतिभागियों को कन्ट्रोल के रूप में लिया गया था। मधुर रस का अत्यधिक सेवन मापने के लिए मधुर रस प्रधान आहार द्रव्य जैसे डेयरी उत्पाद, मक्का, पास्ता, स्टार्ची सब्जिया, क्रीम, गेहूं, चावल, मीठे आलू, केला और खजूर आदि की मात्रा तथा आवृत्ति को लिया गया था। डाटा 2 × 2 तालिका में व्यवस्थित किया गया था और Odds ratio प्रत्येक लक्षण के लिए निकाला गया। परिणाम में देखा गया कि स्थौल्य, आलस्य, निद्राधिक्य, अनन्मभिलाषा, अग्निमांद्य, आनाह, गलशोफ और आस्यमाधुर्य इन लक्षणों के लिए Odds ratio 95: confidence interval के साथ क्रमशः 1.92 (1.17–3.1), 1.28 (0.68–2.45), 1.89 (1.03–3.47), 1.32 (0.70–2.47), 1.82 (1.13–2.96), 1.93 (1.09–3.44), 2 (1.16–3.45) और 1.93 (1.18–3.14) पाए गए। उपरोक्त प्राप्त परिणामों से यह निष्कर्ष निकाला है कि मधुर रस अतियोग यह स्थौल्य, निद्राधिक्य, अग्निमांद्य, आनाह, गलशोफ और आस्यमाधुर्य इन लक्षणों के लिए एक जोखिम कारक है। प्रस्तुत अध्ययन मधुर रस अतियोग के बारे में आयुर्वेदिक शास्त्रीय दावे का समर्थन करता है।

