Original Article

Study of Knowledge, Attitude, and Practice in Participants with Regular Intake of Lathyrus, But No Spastic Paraparesis

Rameshwar Nath Chaurasia, Abhishek Pathak, Smriti Singh[1], Deepika Joshi, Vijay Nath Mishra

Department of Neurology, Institute of Medical Sciences, Banaras Hindu University, [1]Department of Zoology, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Abstract

Background and Purpose: Neurolathyrism is now a disease of the past and also the causative agent, *Lathyrus sativus* (Khesari Pulse or keerai in Local Hindi and Bhojpuri language) has now been proven to be harmless and has become part of the usual diet. **Materials and Methods:** The population at risk was screened and studied for demography, economic status, knowledge about Khesari pulse, awareness about so-called harmful effects of Khesari pulse intake in humans, and the effects of ban of Khesari pulse on the population which is using Lathyrus (Khesari) as a major source of pulse since the past 4 years through a questionnaire of three pages. **Results:** Nearly 97% of total screened population totally fed on Khesari pulse as their major source of food and we did not found a single case of primary walking difficulty. We did find three cases of poststroke paralysis, a case of post-GBS lower limb weakness, and a case of recurrent myelitis as a part of questionnaire-based study and then followed by personally examining the patients to confirm the diagnosis. **Conclusion:** Khesari pulse if consumed in smaller quantities as a part of a normal mixed diet, its nutritional values can be optimally utilized.

Keywords: *Khesari, Lathyrus sativus, motor system disorder, neurolathyrism*

Introduction

Neurolathyrism is now a disease of the past and also the causative agent; *Lathyrus sativus* (Khesari pulse or Keraye in Local Hindi and Bhojpuri language) has now been proven to be harmless and has become part of usual diet.[1] A causal relationship between the excessive consumption of *L. sativus* and neurolathyrism (an upper motor neuron disorder characterized by a spastic paraparesis of the lower limbs) is well known for several decades.[2] It has been discussed that neurolathyrism has been only reported in the extreme conditions of drought or famine[3] but not in normal conditions and afflicts predominantly the lower socioeconomic class. The last recorded episode of the disease was from Ethiopia during the 1995–1997 famine, and in India, it has virtually disappeared during the past three decades despite the continued cultivation and consumption in several states.[4,5] It has become abundantly clear over the past few years that, as a part of the normal diet like most legumes, Khesari pulse appears to be well tolerated. Despite the frequent use of Khesari pulse as a part of the normal diet, this pulse is still banned in many states of India. In the present article, we focused on the heartland of the Indian population which is solely dependent on Lathyrus pulse as their major food and still have no reported incidence of spastic paraparesis in the community. We studied the demographic character, knowledge, and beliefs of the above population with reference to Khesari pulse.

Khesari pulse or *L. sativus* is a legume (family Fabaceae) commonly grown for human consumption and livestock feed in Asia and East Africa. It is a particularly important crop in areas that are prone to drought and famine since this pulse yields reliably even in harsh environmental condition when other fail and hence also known as

Access this article online

Quick Response Code:

Website: www.ruralneuropractice.com

DOI: 10.4103/jnrp.jnrp_305_17

Address for correspondence: Dr. Vijay Nath Mishra, Department of Neurology, Institute of Medical Science, Banaras Hindu University, Varanasi - 221 005, Uttar Pradesh, India. E-mail: vnmishraneuro@bhu.ac.in

How to cite this article: Chaurasia RN, Pathak A, Singh S, Joshi D, Mishra VN. Study of knowledge, attitude, and practice in participants with regular intake of Lathyrus, but no spastic paraparesis. J Neurosci Rural Pract 2018;9:11-3.

"Insurance crop."[6,7] It is widely cultivated in Gangetic plain of Northern India, especially in fields having Karail or black mud with moderate temperature and humid conditions and also has the ability to withstand the drought or flood conditions. Like other legumes, it also improves the nitrogen content of soil.

Materials and Methods

In the present study, we screened and studied the population for demography, economic status, knowledge about Khesari pulse, awareness about so-called harmful effects of Khesari pulse intake in humans, and the effects of ban of Khesari pulse on the population which is using Lathyrus (Khesari) as a major source of pulse since past 4 years.

Our sampling team has surveyed Yusufpur Mohammadabad block of Gazipur district in Eastern part of Uttar Pradesh province of India, an area rich in Karail soil, which has special fertility and high yield for Lathyrus (Khesari).

A total of 9345 participants regularly consuming Khesari pulse were screened. Literate participants were asked to fill the three paged pro forma and were randomly rechecked by investigators and team members. Investigators personally noted the points for illiterate participants. All the participants were asked and physically examined, if required, for any walking difficulty or any other sign(s) of motor system disorders.

Results

For the study period of 4 months, four trained volunteers and two neurologists surveyed Yusufpur Mohammadabad block of Gazipur, in Uttar Pradesh province of India. Population was screened for any neurological disability patients, walking difficulty patients, or any patients with chronic illness. Sample population was demonstrated the three-page pro forma and was filled by village volunteers who were trained by the investigating team, and the data were checked randomly by the investigating team.

Majority (65.3%) of participants belonged to middle age group (31–60 years age) and most of the study participants (82%) were males. A vast majority of the study population (81.5%) depended on agriculture as a primary occupation. Strikingly, only 5% of participants were illiterate, thus overall making the participant groups an educated one [Table 1].

Almost 97% of total screened population totally fed on Khesari pulse as their major source of food, and we did not find a single case of primary walking difficulty. We did find three cases of poststroke paralysis, a case of post-GBS lower limb weakness, and a case of recurrent myelitis as a part of questionnaire-based study [Table 2] and then followed by personally examining the patients to confirm the diagnosis.

Discussion

L. sativus is a common edible pulse in Northern India. Millions of people are dependent on this pulse as a source of protein, as its seeds contain higher protein compared to other legumes.[8] However, due to continued ban on Khesari pulse in Uttar Pradesh due to neurolathyrism risk, fear of arrest among farmers cultivating Lathyrus always makes the perception difficult. The present

Table 1: Study population - baseline characteristics (*n*=9345)

	Subjects questioned, *n* (%)
Age group (years)	
<30	1385 (14.8)
31-60	6106 (65.3)
61-80	1727 (18.4)
≥81	127 (1.3)
Sex	
Male	7663 (82)
Female	1682 (18)
Qualification	
Illiterate	509 (5.4)
Primary and middle	380 (4.1)
Matric and higher secondary	4543 (48.6)
Graduate	3367 (36.1)
Postgraduate	462 (4.9)
More	84 (0.9)
Occupation	
Agriculture	7616 (81.5)
Business	883 (9.4)
Housewife and student	48 (0.6)
Laborer	210 (2.2)
Retired	210 (2.2)
Service	378 (4.1)

Table 2: Study population views regarding khesari dal (*n*=9345)

Questions	Response	Number (%)
Do you know khesari dal?	Yes	9218 (98.7)
	No	127 (1.3)
Do you consume khesari dal?	Yes	8713 (93.2)
	No	632 (6.8)
Do you identify khesari dal?	Yes	9176 (98.1)
	No	169 (1.9)
Do you know that khesari dal is harmful?	Yes	2485 (26.5)
	No	6860 (73.5)
Do you know that khesari dal is banned?	Yes	7113 (76.2)
	No	2232 (23.8)
Do you differentiate khesari dal from other pulses?	Yes	7955 (85.2)
	No	1390 (14.8)

population of Yusufpur Mohammadabad surveyed by us in the present study has also had a similar story like the other hundred thousands of villages in the Gangetic plain. Our study population had high literacy rate and had wide age spectrum, making it a good study group overall.

Recently, four farmers and two traders were arrested for farming and trading *L. sativus*. Due to such contrast in a population which has been using Khesari as a staple primary pulse and at the same time facing arrests by the government, there is a change in attitude and practice of these populations. There have been, however, certain states such as Maharashtra, West Bengal, and Chhattisgarh where the sale of Khesari pulse was not deemed illegal even after the original 1961 ban.[9]

Neurolathyrism is a nonprogressive motor neuron disorder due to prolonged over-consumption of the seeds of *L. sativus* that contain a neurotoxic amino acid β-N oxalyl-L-α, β-diaminopropionic acid (β-ODAP, also called as dencichine).[10] It has been reported that excessive consumption (>300–400 g) of *L. sativus* continuously for 3–4 months as a monotonous diet can lead to neurolathyrism.[11,12] However, if consumed in smaller quantities as a part of a normal mixed diet, its nutritional values can be optimally utilized. This is very important from the Indian context, and even all the recent research publications concur with this.[1] It has even been purported to be the "golden pulse of the future."[13]

In addition, neurolathyrism has almost disappeared from India in the past few decades.[1] Moreover, β-ODAP (dencichine) has been recently granted US and Chinese patents for its therapeutic applications as neuroprotective and hemostatic properties, amounting to further medicinal uses in the coming future.[14,15] It is heartening to know that, recently, a panel constituted by the Indian Council of Medical Research (ICMR) has recommended revoking the ban of Khesari pulse.[16]

Conclusion

The present study highlights the current knowledge, views, and perspectives of the study population from Yusufpur Mohammadabad block (Gazipur district, Uttar Pradesh) regarding Khesari pulse (*L. sativus*). It is the need of the hour that national bodies such as ICMR come up with acceptable safe limits for consuming this legume as a part of a normal balanced diet and thus help in lifting the long-associated stigma associated with its consumption. The availability of this rich source of protein as a part of balanced diet would benefit the marginal classes immensely and is thus of paramount importance with reference to the Indian context.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Singh SS, Rao SL. Lessons from neurolathyrism: A disease of the past & the future of *Lathyrus sativus* (*Khesari dal*). Indian J Med Res 2013;138:32-7.
2. Dwivedi MP, Prasad BG. An epidemiological study of lathyrism in the district of Rewa, Madhya Pradesh. Indian J Med Res 1964;52:81-116.
3. Mishra VN, Tripathi CB, Kumar A, Nandmer V, Ansari AZ, Kumar B, *et al.* Lathyrism: Has the scenario changed in 2013? Neurol Res 2014;36:38-40.
4. Getahun H, Mekonnen A, TekleHaimanot R, Lambein F. Epidemic of neurolathyrism in Ethiopia. Lancet 1999;354:306-7.
5. Misra UK, Sharma VP, Singh VP. Clinical aspects of neurolathyrism in Unnao, India. Paraplegia 1993;31:249-54.
6. Campbell CG. Grass pea (*Lathyrus sativus* L.) Promoting the Conservation and Use of Underutilized and Neglected Crops. Institute of Plant Genetic and Crop Plant Research, Gatersleben/International Plant Genetic Resources Institute; Rome: Italy; 1997. p. 18.
7. Khandare AL, Babu JJ, Ankulu M, Aparna N, Shirfule A, Rao GS, *et al.* Grass pea consumption & present scenario of neurolathyrism in Maharashtra state of India. Indian J Med Res 2014;140:96-101.
8. Monsoor MA, Yusuf HK. *In vitro* protein digestibility of *Lathyrus* pea (*Lathyrus sativus) lentil (Lens culinaris)* and chick pea (*Cicer arietinum*). Int J Food Sci Technol 2002;37:97-9.
9. Available from: http://www.times.of.India.Indiatimes.com/city/varanasi/Banaras-Hindu-University-study-debunks-khesari-dal-perception/articleshow/28581641.cms. [Last accessed on 2017 Jan 08].
10. Spencer PS, Roy DN, Ludolph A, Hugon J, Dwivedi MP, Schaumburg HH, *et al.* Lathyrism: Evidence for role of the neuroexcitatory aminoacid BOAA. Lancet 1986;2:1066-7.
11. Ludolph AC, Spencer PS. Toxic models of upper motor neuron disease. J Neurol Sci 1996;139 Suppl:53-9.
12. Khandare AL, Babu JJ, Ankulu M, Aparna N, Shirfule A, Rao G. Authors' response. Indian J Med Res 2015;141:128.
13. Hyderabad, India: National Institute of Nutrition (ICMR). Session-IV. Lathyrus: The Golden Pulse of the Future. International Conference on "Recent Trends in *Lathyrus sativus* Research"; 2012. p. 8-9.
14. Zhao G. Fourth Military Medical University. Not Ginseng Factor in Preparing Medicine for Treating Neurodegenerative Diseases drugs Application of Dencichine in Preparation of Medicament for Treating Neurodegenerative Diseases. China Patent, CN 102579418A; 2012.
15. Compositions and Methods for Treating Haemorrhagic Condition. United State Patent, 20110160307; 2011.
16. Available from: http://www.Indianexpress.com/article/india/india-news-india/icmr-panel-clears-unsafe-khesari-dal-banned-in-61/. [Last accessed on 2017 Jan 08].