

An epidemiological study on incidence and determinants of Lathyrism

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Abstract

Introduction: Human lathyrism continues to be a public health problem in central India. While osteolathyrism, as such, is not a public health problem, neuro-lathyrism is of particular importance especially in central parts of India. In particularly Rewa, Satna, Sidhi, Sagar, Seoni, Hoshangabad and Chhattisgarh area of Madhya Pradesh bear the brunt of lathyrism. Ganapathy and Dwivedi (1961) carried out epidemiological study in estate of Vindhya Pradesh (now part of Madhya Pradesh). The sale of *L. sativus* has been banned in many states in India, but there has not been an effective ban on its cultivation. *Lathyrus sativus* is hardy crop and survives adverse agricultural conditions. For this reason it has become a main stay of some Indian diets, especially under famine conditions. India farmers continue to grow this pulse despite their awareness of its poisonous nature. It is difficult to provide an alternate crop that would grow under the semi-arid condition of these areas. In recent times, the problem has acquired new dimensions, which hold out possibilities of wider dissemination of the disease. It was probably true that the consumption of *Lathyrus* seeds had dropped during recent times, but this was probably because other crops like wheat, barley, lentils and Bengal gram had flourished.

Material & Method: In order to study the recent trends of lathyrism, the same area and technique have been adopted as were follow by Ganapathy & Dwivedi (1961) and Dwivedi and Prasad (1964). Revisit to study the same area where detail epidemiological work was carried out and reported by Dwivedi & Prasad (1964). They were the following 18 village of Rewa and 10 village of Satna districts. The other part of study included the collection of information of occurrence of cases occurred during the last 10 years period i.e. case occurring from 1975 to 1982. The area of survey restricted to Rewa division to determine those factor responsible for secular variations in the prevalence of disease from the previous I.C.M.R. study spread over a period of 1956 – 1961 (Ganapathy and Dwivedi. 1961). The standard survey protocol was adopted. Only the established form of disease was investigated. The latent form of disease was not investigated. The established form directly affects the man power and in major public health problem.

Observations: The prevalence of disease is higher amongst the male in previous studies (1964) as well as in year 1982. The maximum duration of disease was 10 to 14 years (32.72%) in previous study (1964) where as it is only 4.30 percent in year 1982. Cases of lathyrism occur round the year, both studies reveal that maximum cases occurred from June to October. The maximum cases being 58 (32.76%) were among Kole (S.T.) followed by Chamar being 16.38 percent. The cases amongst Kurmi and Brahmins are equally high being 14.12 and 13.55 percent respectively. The disease was mainly present in low socio-economic group of people being 67.79 percent and 26.5 percent had from class IV socio-economic group. Maximum patients i.e. 115 were landless and 47 had land only up to two acres. Out of them 72.34 percent were growing 'Birri' i.e., mixture of *L. sativus* 25-50 percent. Disease was mainly restricted amongst the illiterate but as the literacy status increases the disease was is decreasing.

Conclusion: Though the frequency and the magnitude of lathyrism had been reduced, but sporadic cases do occur in some part of the country. Therefore, it is necessary that prevention of lathyrism shall be integrated in general health care programme on regional basis. Surprisingly researches are going on to develop high yielding and less toxic variety of Khesari dal and certainly one cannot ignore the health of the people which is jeopardized by the use of the poisonous pulse resulting in permanent paralysis simply because they belong to the under-privileged sections of the society.

Keywords: Lathyrism, *L. sativus*, Khesari dal, Rewa

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Introduction

Lathyrism in human beings is an ancient disease caused by the consumption of the seeds of certain species of *Lathyrus* particularly those of *L. sativus*

(Chicking vetch or chick pea), and the seeds (Pulse) is habitually eaten by large populations in central India. Human lathyrism continues to be a public health problem in central India, where this crippling disease afflicts people living in poorer sections of the country particularly where there is recurrent drought leading to scarcity of food stuffs other than *L. sativus* which is a hardy crop.^{1,2,3}

Lathyrism, a crippling disease, has been reported in a number of countries in Europe, Africa and Asia viz., France, Italy, Spain, Syria, Algeria, India, Bangladesh and tsarist Russia etc.

While osteolathyrism, as such, is not a public health problem, neuro-lathyrism is of particular

importance especially in central parts of India. In particularly Rewa, Satna, Sidhi, Sagar, Seoni, Hoshangabad and Chhattisgarh area of Madhya Pradesh bear the brunt of lathyrism. The first reference to lathyrism in Rewa region occurs in General W.H. Sleeman's Rambles and Recollection of an Indian official (1844).⁴ A Buchanan (1927), an Indian Medical officer, gave a detailed analysis of lathyrism outbreaks during the famine years of 1896-1907.⁵ In 1922, H.W. Acton estimated 60,000 lathyrism cases in northern Rewa.^{6,7}

Ganapathy and Dwivedi (1961) carried out epidemiological study in estate of Vindhya Pradesh (now part of Madhya Pradesh) under the auspices of I.C.M.R.

Raipur division of Madhya Pradesh experienced the first epidemic in Chhattisgarh during severe drought in 1974 (Dwivedi & Mishra. 1977).⁸ There has also been a recent report of the disease in Bangladesh (Cato All. 1974-76). The sale of *L. sativus* has been banned in many states in India, but there has not been an effective ban on its cultivation. *Lathyrus sativus* is hardy crop and survives adverse agricultural conditions. For this reason it has become a main stay of some Indian diets, especially under famine conditions. India farmers continue to grow this pulse despite their awareness of its poisonous nature. It is difficult to provide an alternate crop that would grow under the semi-arid condition of these areas.

The role of this pulse is also recognized in Madhav Nidan. Further Hippocrates was also knowledge of certain harmful pulses. Not only the clinicians and scientist but also some rulers acknowledged and banned the use of *Lathyrus*. George. Duke of wurttensburg (1671) and his successor Leopald (1706) issued a proclamation banning the use of *Lathyrus*. In India Ruler of Rewa state Maharaja Venkat Raman singh judeo on 29th Nov. 1907 prohibited cultivation of Khesari dal (Acton. 1922).

With meager information available, it is not possible to confirm any trends. The information available in hospital records will not completely reflect the entire community morbidity picture. In recent times, the problem has acquired new dimensions, which hold out possibilities of wider dissemination of the disease. It was probably true that the consumption of *Lathyrus* seeds had dropped during recent times, but this was probably because other crops like wheat, barley, lentils and Bengal gram had flourished. With this changing background and the conflicting reports, the present study has been undertaken with a modest desire to ascertain the current prevalence of the disease and other connected factors in the districts of Rewa and Satna (MP), India.

Material & Method

In order to study the recent trends of lathyrism, the same area and technique have been adopted as were

follow by Ganapathy & Dwivedi (1961) and Dwivedi and Prasad (1964).^{9,10} Revisit to study the same area where detail epidemiological work was carried out and reported by Dwivedi & Prasad (1964). They were the following 18 village of Rewa and 10 village of Satna districts.

Villages of Rewa District: Panasi, Jivla, Kostha, Lawa, Girui, Majan, Bakchera, Roura, Pallia, Kuinya, Ratehari, Mahuli, Pallia Kothar, Patna, Pipari, Shukli, Dhekare, Ratehra.

Villages of Satna District: Pipari, Karra, Harduwa, Ganga Sagar, Bhitari, Ganjas, Ramnagar, Chorahata, Dudha, Kotar.

The other part of study included the collection of information of occurrence of cases occurred during the last 10 years period i.e. case occurring from 1975 to 1982.

The area of survey restricted to Rewa division to determine those factor responsible for secular variations in the prevalence of disease from the previous I.C.M.R. study spread over a period of 1956-1961 (Ganapathy & Dwivedi. 1961).⁹ The following survey protocol was adopted.

1. The family was the unit of approach for detecting establishes form of lathyrism cases. All members of families of the selected village were examined for details clinical features of the disease with history of consumption of Khesari dal (*L. Sativus*)
2. Name, age, sex and relationship in respect of the head of the family were recorded.
3. All the inmates of a house were examined. The examination of the complete nervous system in general and paraplegia in particular was done. The gait of the patient, which is spastic and scissors in character, was observed and recorded carefully for the differential diagnosis and classification of the forms and stages of the disease.

Subjects showing positive neuro-logical signs were interrogated as to their complaints, sequence of the development of the disease audits relation with the food they take and a pretested proforma was filled for vital information.

In 28 villages selected having a total population of 24,423,177 persons were found to have positive neurological signs of lathyrism with definite history of consumption of *L. sativus*. Only the established form of disease was investigated. The latent form of disease was not investigated. The established form directly affects the man power and in major public health problem.

There have not been major out breaks and drought of disease in post two decades in this region. Sporadic small out-breaks however have been reported off and on in this area. It was in general impression that there was a decline in prevalence of disease.

Data was compiled in MS excel and checked for its completeness and correctness then it was analyzed.

Observations

Table 1 has been drawn giving information of population, total number of cases and cases which occurred before 1962 and then year wise occurrence of cases from 1962 to 1982. It can be seen that total number of cases which were reported by Ganapathy and

Dwivedi (1961) were 110 in Rewa and 113 in Satna District. In the present survey the numbers of cases are declined being 93 and 84 respectively. It can also be seen that a few of the village are still maintaining almost the same number of cases.

Table 1: Village wise distribution of cases in Rewa & Satna District

Village	Dwivedi & Prasad (1964)			Present study Cases				Population 1971 Census
	Surveyed population	Cases	%	Cases	%	Before 1962	After 1962	
18 from Rewa District	7,559	110	1.4	93	0.81	28	65	11,450
10 from Satna District	8060	113	1.4	84	0.64	30	54	12956

The prevalence rate of 0.7% of the established form of Lathyrism was worked out in 28 villages having 24,423 populations with 177 cases, since the selection was done on random basis, thus it can be a representative sample.

Ganapathy and Dwivedi (1961) detected 110 established cases in a population of 5,768 of 18 villages. The estimated number of established form of lathyrism was worked for Rewa district having a population of 6,33,706 (1951) was 12,085. In the present study there were 93 lathyrism cases in the population of 11,450. The projected number of established cases for Rewa district having 11,03173 population (rural area) can be estimated to be 8960. [Table 1, Fig. 1]

Fig. 1 shows that sex wise distribution of established cases of lathyrism. There were 90.09 percent males in previous year (1961) and 87.01 percent in 1982. The percentage of females was 9.9% and 12.9% in previous study (1961) and 1982 respectively.

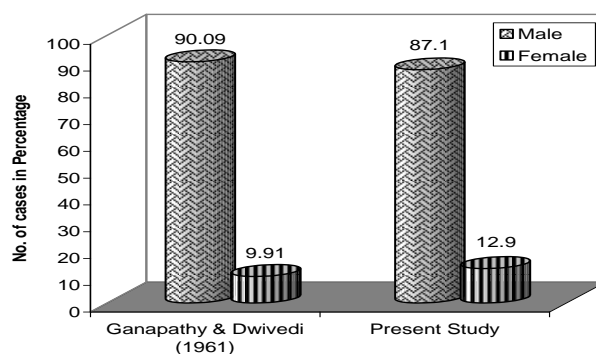


Fig. 1: Gender wise distribution of study subject

Table 2: Duration of the disease among established cases in 18 villages of Rewa District

Duration in years	Dwivedi & Prasad (1964)				Present study			
	Male	Female	Total	%	Male	Female	Total	%
<4	28	2	30	29.29	8	3	11	11.84
5-9	20	3	23	20.9	12	1	13	13.98
10-14	33	3	36	32.72	4	-	4	4.30
15-19	4	1	5	4.54	5	1	6	6.46
20-24	9	-	9	8.18	20	2	22	23.65
25-29	-	1	1	0.90	5	1	6	6.45
30-34	5	-	5	4.54	13	2	15	16.12
35-39	-	-	-	0.00	7	1	8	8.60

40-44	1	-	1	0.90	6	-	6	6.46
45-49	-	-	-	0.00	-	1	1	1.07
> 50	-	-	-	0.00	1	-	1	1.07
Total	100	10	110	100.00	81	12	93	100.00

The prevalence of disease is higher amongst the male in previous studies (1964) as well as in year 1982. The maximum duration of disease was 10 to 14 years (32.72%) in previous study (1964) where as it is only 4.30 percent in year 1982. As the duration of disease advances the number of cases gradually decreases in previous study (1964) where as it is not so in the year 1982. [Table 2]

The above table shows that the numbers of cases are same that being 110 in previous studies (1964) and 93 in 1982. Table also shows that the number of cases below 19 years in previous study (1964) was 22 while they are 9 in 1982 this shows that problems of lathyrism declining in community. Cases above age of 50 years in previous study (1964) were 17 and 1982 they are 44 cases in same age group. It is also evident that male and female were 90.91% and 9.09 percent respectively in previous study (1964) while 87.1% and 12.9% respectively in 1982. Thus it is evident that sex incidence has not materially change [Table 3]

Table 3: Age wise distribution of lathyrism patients in 18 villages of Rewa District

Age group In years	Dwivedi and Prasad (1964)				Present study			
	Male	Female	Total	%	Male	Female	Total	%
<4	-	-	-	-	-	-	-	-
5 – 9	3	1	4	3.66	1	-	1	1.07
10 – 14	8	1	9	8.18	4	-	4	4.30
15 – 19	8	1	9	8.18	2	2	4	4.30
20 – 24	12	2	14	12.74	1	-	1	1.07
25 – 29	14	3	17	15.18	3	1	4	4.30
30 – 34	12	-	12	10.91	6	-	6	6.45
35 – 39	11	-	11	10.00	9	1	10	10.76
40 – 44	9	-	9	8.18	8	3	11	11.84
45 – 49	8	-	8	9.28	7	1	8	8.60
>50	15	2	17	15.18	40	4	44	47.31
Total	100	10	110	100.00	81	12	93	100.00

The age at onset is mainly restricted to late childhood, adolescence and in the young adults in the previous study (1964) and 1982. The maximum cases are between 5 years to 34 years being 76.33 percent and 79.57 percent in previous study (1964) and (1982) respectively. *The most striking features is absence of cases in the female during the reproductive age group, except in 15-19 years having 3 cases in which 2 got in an advanced stage of pregnancy while the other during lactation period. She had amenorrhea of lactation at the time of the onset of lathyrism. [Table 4]

Table 4: Distribution of lathyrism patients according to age on onset

Age group in years	Dwivedi and Prasad (1964)				Present study			
	Male	Female	Total	%	Male	Female	Total	%
<4	1	-	1	0.91	2	1	3	3.21
5 – 9	8	2	10	9.09	6	3	9	9.68
10 – 14	11	4	15	13.63	10	2	12	10.90
15 – 19	13	1*	14	12.72	15	3*	18	19.35
20 – 24	16	1*	17	15.45	13	-	13	13.98
25 – 29	14	-	14	12.72	7	-	7	7.55
30 – 34	12	-	12	10.91	15	-	15	16.13
35 – 39	8	-	8	7.28	5	-	5	5.38
40 – 44	8	-	8	7.28	4	-	4	4.30
45 – 49	3	1	4	3.64	1	-	1	1.07
>50	6	1	7	6.36	3	3	6	6.45
Total	100	10	110	100.00	81	12	93	100.00

Incidence and prevalence of lathyrism in the last two decades. It may be seen that in the first decade (1950-59) 51 fresh cases occurred in the population of 7559, while in the decade 1972-81 there were fresh cases in the average population of 13146. The incidence rate works out to be 2.12/1000. These rates throw considerable light on the secular trends in the epidemiology of lathyrism. [Table 5]

Table 5: Year wise prevalence of established form of lathyrism in 18 vilages of Rewa District

Year	Midyear population	No. of cases	Incidence/ 1000	Old cases	Total cases	Prevalence/ 1000
1950-59*	7559	51	6.7	59	110	14.5
1972	11773	1	0.08	65	66	5.6
1973	12079	0	0.00	66	66	5.4
1974	12384	8	0.00	66	66	5.3
1975	12689	1	0.63	66	74	5.8
1976	12994	6	0.08	74	75	5.9
1977	13299	7	0.45	75	81	6.0
1978	13604	4	0.51	81	88	6.4
1979	13909	1	0.29	88	92	6.6
1980	14214	0	0.07	92	93	6.5
1981	14519		0.00	93	93	6.5

Above table gives information of occurrence of fresh cases in the last three decades. Though there were fluctuation in the number of cases, But no year was free from the occurrence of cases in the first decade from 1950-59. In the second decade starting from 1960-69 cases did not occur in 1960, 1961, 1965, 1966, 1968 and 1969. But in the third decade from 1970-79 fresh cases did not occur in 1971, 1973 and 1974. This indicates that there is no consistency of occurrence of cases of lathyrism [Table 6].

Table 6: Occurrence of fresh cases of lathyrism in 18 villages of Rewa District in the past 10 years

Ganapathy & Dwivedi, (1961)		Present study			
Years	Cases	Years	Cases	Years	Cases
1950	7	1960	---	1970	2
1951	1	1961	---	1971	---
1952	2	1962	23	1972	1
1953	5	1963	6	1973	---
1954	10	1964	1	1974	---
1955	2	1965	---	1975	8
1956	7	1966	---	1976	1
1957	2	1967	2	1977	6
1958	1	1968	-	1978	7
1959	14	1969	-	1979	4

It can be seen that there is not much difference in the prevalence of cases of lathyrism with different in both the studies. [Table 7]

Table 7: Stage wise distribution of lathyrism patients in 18 villages of Rewa District

Years	Sex	Population surveyed/ Census	Stage of established form of lathyrism				
			Stick Stage			Crawler stage	Total
			No	One	Two		
Ganapathy & Dwivedi (1961)	Male	3038	72	22	5	1	100
	Female	2730	10	-	-	-	10
Present study 1982	Male	4732	46	32	2	1	81
	Female	4789	9	3	2	-	12

It can be seen that cases of lathyrism occur round the year, both studies reveal that maximum cases occurred from June to October. [Table 8]

Table 8: Seasonal variation of lathyrism patients

Months (Local-dialects)	Approximately corresponding English Months	Ganapathy & Dwivedi (1961)		Present Study	
		No.	%	No.	%
Chaitra	March	1	0.5	-	-
Beisakh	April	1	0.5	-	-
Jeth	May	-	0.0	3	1.69
Asadh	June	46	23.0	35	19.77
Sawan	July	60	30.0	58	32.77
Bhandon	August	37	18.5	34	19.21
Kunwar	September	38	19.0	32	18.07
Kartik	October	12	6.0	13	7.34
Aghan	November	1	0.5	-	-
Poosh	December	-	0.0	1	0.56
Magh	January	1	0.5	1	0.56
Phalgun	February	3	1.5	-	0
Total		200	100.0	177	100.0

Above table shows distribution of cases in relation to their religion and caste. The maximum cases being 58 (32.76%) were among Kole (S.T.) followed by Chamar being 16.38%. The cases amongst Kurmi and Brahmins are equally high being 14.12 and 13.55%, respectively. The cases are minimum being 1.13% each amongst Rajput, Muslim, Kotwar, Namdeo, Basore, Ahir and Kori. There was only one case of lathyrism in Lohar community. [Table 9]

Table 9: Caste wise distribution of lathyrism

Sl. No.	Caste	No.	%
1.	Kole	58	32.76
2.	Chamar	25	16.38
3.	Kurmi	29	14.12
4.	Brahmin	24	13.55
5.	Kacchi	15	8.47
6.	Teli	5	2.82
7.	Bani	3	1.69
8.	Kewat	3	1.69
9.	Kori	2	1.13
10.	Ahir	2	1.13
11.	Basore	2	1.13
12.	Namdeo	2	1.13
13.	Kotwar	2	1.13
14.	Lohar	1	0.56
15.	Thakur	2	1.13
16.	Muslim	2	1.13
Total		177	100.00

Table shows the maximum cases were recorded as un-skilled laborers being 72.31 percent where as agriculturist were 14.69 percent. The table also shows the disease was mainly restricted to the weaker strata of society. [Table 10]

Table 10: Occupation wise distribution of lathyrism

Occupation group	No.	%	
Petty Shopkeeper	1	0.57	
Agriculturist	26	14.69	
Labourers	Skilled	12	6.78
	Un-Skilled	128	72.31
Other Student/Minor	10	5.65	
Total	177	100.00	

The disease was mainly present in low socio-economic group of people being 67.79% and 26.5% had from class IV socio-economic group. None of case reported from socio-economic group I and II and 5.64% were from group III socio-economic classification [Table 11].

Table 11: Distribution of cases by their socioeconomic status

Scale	Socio-economic class		No.	%
I	> Rs. 1000	Rich	--	--
II	Up to Rs. 1000	Upper middle	--	--
III	Up to Rs. 450	Lower middle	10	5.65
IV	Up to Rs. 210	Poor	47	26.56
V	Up to Rs. 150	Very Poor	120	67.79
Total			177	100.00

Maximum patients i.e. 115 were landless and 47 had land only up to two acres. Out of them 72.34 percent were growing 'Birri' i.e., mixture of *L. Sativus* 25-50 percent. Bengal gram and wheat, where as only 27.66 percent were growing mixture which contained more than 50.0 percent of *Lathyrus* seeds. None of the patient was found sowing pure *Lathyrus sativus* in their small agricultural land. [Table 12]

Table 12: Land holding of lathyrism affected person and their crop pattern

Land holding	No.	Lathyrism	Affected		Cases	
		Showing <i>L. sativus</i> only	25-50% <i>L. sativus</i> in 'Birri'		> 50% <i>L. sativus</i> in Birri	
			No.	%	No.	%
No land	115	---	---	---	---	---
< 2 acres	47	---	34	72.34	13	27.66
< 4 acres	11	---	11	100.0	---	---
< 6 acres	4	---	4	100.0	---	---
Total	177	---	49	---	13	---

Disease was mainly restricted amongst the illiterate but as the literacy status increases the disease was decreasing [Table 13].

Table 13: Distribution of cases by their literary status

Group	No.	%
Illiterate	145	81.93
Just literate	21	11.86
Primary	10	5.65
Middle	1	0.56
Secondary	--	---
College	--	---
Total	177	100.00

It can be observed from above table that not a single patient was aware that *L. Sativus* might cause lathyrism before he/she actually suffered from the diseases. Only 26.55 percent could know the actual cause after they developed the diseases and the majority of patients, i.e. 73.45 percent still believed that it was due to evil winds or curse of God [Table 14].

Table 14: Awareness of disease being caused by *L. sativus* in diseased person

Awareness	No.	%
Before Diseases	-	-
After Diseases	47	26.55
Still unaware	130	73.45
Total	177	100.00

Out of 177 cases out of these, maximum 36 (20.33%) cases had shown tingling and numbness as first symptom followed by stiffness 14.68 percent of lower extremities. Only 11 cases i.e. 6.21 percent noticed fever and 17 i.e. 9.62 percent complained of weakness of lower extremities [Table 15].

Table 15: Distribution of cases by main symptom of the disease

Symptoms	No.	%
Backache	19	10.74
Tingling/Numbness	36	20.33
Stiffness	26	14.68
Weakness	17	9.62
Fever	11	6.21
Others	47	26.56
No. Complaint	21	11.86
Total	177	100.00

Discussion

Lathyrism is known and recognized in India since last few centuries. It cripples the patient in most productive period of his life making incapacitated and burden on the family. Northern and Central parts of the country mainly Uttar Pradesh, Bihar and Madhya Pradesh have inhabited the worst sufferers of the disease.

General Sleeman (1844) gave the first detail touching account of the outbreak of disease in Madhya Pradesh in 1831 in his book "Rambles and Recollections of an India Official". He being a non-medical man but has meticulously correlated the disease with *Lathyrus sativus*, drought and other epidemiological factors.⁴

Ever since only sporadic efforts were made to investigate the out breaks of the out breaks of the disease, and preventive measures used to be taken. All these studies (Acton, 1922)^{6,7} Mocobie young (1928), Rudra and Kant (1952) and Roy (1951) etc.¹¹ pointed out that there was association of consumption of *L. Sativus* with the occurrence of the disease. It was in 1956 that I.C.M.R. established Field unit at Rewa and multifaceted efforts were made to understand the epidemiology, exact causative factors in the seed of *Lathyrus sativus*. The unit submitted the report in a form of a book "Clinico-epidemiological studies of lathyrism in Vindhya Pradesh" Ganapathy and

Dwivedi, 1961. The salient features and recommendations made by the investigators were as follows:-

Banning of the crop of *Lathyrus sativus* through legislations, would be the best method, if this could be made practically feasible. An important practical difficulty could be to provide the people an alternative suitable crop in place of *Lathyrus sativus* which can be grown in the region and under similar agricultural and climatic conditions.

It was also suggested that the *Lathyrus sativus* be gradually withdrawn in exchange of wheat or other suitable cereals. If this type of operation was continued for few years, it was hoped that within a period of 3-4 years, whole of the seeds of *Lathyrus* could have been withdrawn. Further other seeds may be made available at subsidized rates for the cultivators in this region so as to encourage the cultivation of other crops in place of *Lathyrus sativus*.

Another suggestion was inducements of revenue remission to the agriculturists who give up the cultivation of *Lathyrus sativus* and practice cultivation of other crops. The people should be discouraged to use *Lathyrus sativus* by means of intensive publicity and propaganda by posters, pamphlets and cinema exhibition showing the harmful effects of the use of *Lathyrus sativus* as food. It was also suggested that this programme could be implemented through community development Blocks and Social welfare organizations.

The comparative study which was undertaken in 18 villages of Rewa and 10 Villages of Satna districts show that the prevalence of established form of lathyrism has come down from 1.4 percent (Dwivedi & Prasad, 1964) to 0.8 percent in Rewa district and from 1.4 percent to 0.64 percent in Satna district. This study was done in the same area and the same technique was adopted as was followed by Dwivedi & Prasad (1964) and Ganapathy & Dwivedi (1961). Present study shows that age, sex wise distribution of cases was same as observed in earlier study, also it confirmed the hypothesis of Dwivedi and Prasad (1964) that in females the disease occurs before puberty and after menopause.

The study of annual incidence and prevalence shows that the incidence of the disease is fluctuating. No fresh case was recorded in 1973, 1974 and 1981, in these villages, but in other years, fresh cases did occur. On the other hand fresh cases of lathyrism were occurring in other villages of Rewa and Satna districts in these years.

The other of study relates to the collection of information of cases occurring during last 5 years period i.e. from 1978 to 1982. The study was carried out in 55 villages belonging to Rewa and Satna districts. The family was the unit of approach for detecting established form of lathyrism cases. The study was mainly of the nature of case study based on the information collected from various sources as well as

through detection of fresh case by visiting the families and actually enquiring of the fresh cases. It was also aimed to study the market forces and cropping pattern in relation to production, distribution and consumption of 'Khesari dal' in the areas under study. Village heads, traders operating on ponnies, traders working in 'mandies' etc. were interrogated to study the market forces.

The study of age and sex distribution of established cases of lathyrism shows that there was hardly any deviation between the previous and the present studies. As regards age one aspect was observed that in the present study there are more cases belonging to the age above 55 years. This shows that comparatively less number of fresh cases are occurring and the bulk of cases is constituted of old cases in the community. The age of onset of disease is mainly restricted to late childhood, adolescent, and young adults. Both in previous study (Ganapathy and Dwivedi, 1961) and present study of 1982, the age of onset of disease is maximum between 5 to 34 years, being 76.33 percent and 79.57 percent respectively.

The study shows that the incidence and prevalence rate of the disease is at decline. The incidence even reached to zero in the years 1973, 1974 and 1981. But it can be seen that 36 fresh cases were reported in many villages of Rewa, Satna and Sidhi Districts.

Dwivedi & Prasad (1964) observed that in female 60.0 percent got the disease before the age of puberty and 20.0 percent after menopause and rest of the 20.0 percent got the onset during physiological amenorrhea of pregnancy and lactation. In the present study similar observations were also made. Cato All (1976) also made similar observation in Bangladesh.¹²

Ganapathy and Dwivedi (1961) in a special study reported 200 families having cases of Lathyrism, but the present study revealed that only 158 families were having lathyrism cases in corresponding villages. They reported that 79.5 percent of the families had single case, while 20.5 percent families had two or more cases. In the present 91.1 percent families had single case and only 8.9 percent of families had more than one case. This shows that there is also decline in total number of families involved as well as in number of cases per family.

Record of occurrence of fresh cases in the last 3 decades in the 18 villages reveals that there is wide range of fluctuation in occurrence of cases varying from zero in 1973-1974 to 23 in 1962. In both studies majority of cases have been in non stick and one stick stages of established form. Number of cases in stage of two sticks and Crawler were few in the present study.

It is common observation from study of Ganapathy and Dwivedi (1961) and present study that maximum numbers of cases are recorded in the month of Jun-October where as in rest of months cases were very few. Maximum cases were seen in month of July, being 30.0 percent in the previous study, 32.77 percent in

present studies. Number of cases were less in other months probably because of harvesting in month of April and then it being given in form of wages to laborer and servant, they consume it afterwards manifest the disease during rainy season or premonsoon period.

In order to study the current and secular trends, the information was collected from hospitals, through medical officers of P.H.C.'s, from rumors and from other sources also. All these informations were verified by actual visit of the villages. There were 55 villages of Rewa, Satna and Sidhi districts from where cases were reported. The overall prevalence rate of 0.7 percent of these established cases were worked out in 28 villages having 77 cases in a population of 24,423. Since selection of villages was random, the projected figure of established case of lathyrism for Rewa and Satna districts having population 21,55,382 (only rural area) can be about 15,628 Ganapathy and Dwivedi (1961) reported 32,000 estimated cases of lathyrism.

The study of 55 villages shows that the prevalence of lathyrism was 0.16 percent in Rewa and 0.66 percent in Satna. It was interesting to find out that there is a positive association of prevalence of the disease and distance of villages from Main Township. Out of 55 villages only 12 were on the road side while 43 villages were remotely situated. This is because siphoning of Lathyrus Sativus is comparatively difficult from the remote villages, while siphoning is easier on road side villages.

The maximum cases 32.76 percent belong to Kole community which is a scheduled Tribe, followed by Chamars (Scheduled Caste). This is due to the fact that persons from these communities constitute the bulk of labourers who get Lathyrus in lieu of wages. Majority of cases had no land at all. A very few had holding less than 2 acres and still fewer had land holding of 4 acres or more. Similar association of the occurrence of lathyrism in relation to occupation, economic status and literacy status was reported by earlier workers (Kojewnikoff, 1894., Action, 1922, Buchanan, 1927, Youg, 1927-28, Ganapathy & Dwivedi, 1961 and Dwivedi & Prasad, 1964, etc.) also.^{5,6,7,13}

Conclusion

The present study reveals that there is practice of exporting Lathyrus sativus from rural areas by the cultivators. But this is not a constant feature. As the irrigation facilities are practically negligible in Rewa division. L. Sativus is cultivated in the form of mixed crop which serves as an insurance crop during drought. In such circumstances, L. Sativus is mostly retained at the village level. The system of payment of Lathyrus in lieu of wages still exists in this area, but the agricultural laborers do not solely depend on this as there are some other sources of earning too.

The health dept. functionaries have not included reporting of cases of lathyrism so far. This might have

led to the false belief that lathyrism is no more a public health problem in this area. The major part of the recommendations given by previous workers (Ganapathy and Dwivedi, 1961) has not been fulfilled as yet. There is some element of awareness regarding the harmful effects of L. Sativus, still it is being doled out to laborers who accept it. Thus there seems to be very little impact of health education among the people in the Lathyrus growing area.

While comparing the prevalence of Lathyrus from previous studies, it was observed that though the disease is showing a declining pattern, but it still continues to occur sporadically in all the three districts of Rewa division, particularly in the years followed by drought. The distribution of the disease is erratic but is associated with the movement and consumption pattern of L. sativus.

Recommendations

Short Term Measures: Though the frequency and the magnitude of lathyrism had been reduced, but sporadic cases do occur in some part of the country. Therefore, it is necessary that prevention of lathyrism shall be integrated in general health care programme on regional basis. Reporting of cases, like other diseases, should be made compulsory, in the endemic areas of the disease. To strengthen this surveillance committees may be formed at village, Block and District levels of administration to look after health and welfare of lathyrism affected and lathyrism prone families and communities, i.e. whose member are engaged as agriculture laborers and are petty farmers. In the affected areas arrangement should be made for periodical supplementation of fair price grain distribution during food shortages to the lathyrism prone families. Health education has to be carried out through appropriate mass media to educate people about the menace of consumption of Khesari dal.

Long Term Measures: Improvement in socio-economic conditions in villages and general standard of living of people by developing small scale industries may however gradually eliminate the practices of cultivation of Khesari. Surprisingly researches are going on to develop high yielding and less toxic variety of Khesari dal and certainly one cannot ignore the health of the people which is jeopardized by the use of the poisonous pulse resulting in permanent paralysis simply because they belong to the under-privileged sections of the society.

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