

GENERAL ARTICLE

Studies on cases of chronic Arsenic toxicity and its implication in the development of Homoeopathic Materia Medica and Repertory

Prof.(Dr.) Asok Kumar Das*, G. Podder, A. Nandi, Snigdha Chattopadhyaya,
Mohan Giri, Arup Kumar Pal, Chandra Shila Jadav,

National Institute of Homoeopathy, Kolkata had received grant-in-aid from Deptt. of AYUSH, Ministry of Health & Family Welfare under Extra Mural Research Scheme for carrying out study on "Clinical, Haematological, Bio-chemical and Immunological Studies on patients of Chronic Arsenic Toxicity and its Homoeopathic Management" in the affected areas of West Bengal. Study was done in collaboration with School of Tropical Medicine, Kolkata, Defence Institute of Physiology and Allied Sciences, Delhi and Bose Institute of Fundamental Studies, Kolkata.

The gist of the study is being published here for the benefit of the profession. We welcome comments, if any, from the readers.

Editorial Board

Abstract

Next to pure proving material, toxicological data is the most rewarding sources of symptomatology of homoeopathic *Materia Medica*. Much of the information of the homoeopathic *Materia Medica* derives directly from reports of poisonings. There are several arsenic compounds used in Homoeopathy as medicines. Among them *Arsenicum album* is one of the most frequently used one. It was proved by Hahnemann and its symptoms included in homoeopathic *Materia Medica* were derived from both proving and toxicological studies. Since this medicine was studied long back, it will be worthwhile to study it at the present perspective. The present toxicological study showed 89 symptoms, among which 71 symptoms were already mentioned in the *Materia Medica* and *Synthesis Repertory*. But rest of the 18 symptoms were neither included in homoeopathic *Materia Medica* like *Herings Guiding Symptoms*, *Allen's Encyclopedia*, *A Drug Pathogenesis of Huges and Dake*, nor even in *Synthesis Repertory*. These newly observed symptoms can be incorporated in *Materia Medica* and *Repertory* after clinical confirmation. Such clinical confirmation is essential to prove their genuineness as well as their comparative value.

Key Words: *Arsenic toxicology, Drinking water, Chronic arsenic toxicity/Chronic arsenicosis, Homoeopathy.*

Introduction

The pollution of ground water by arsenic through geochemical contamination is one of the recently identified natural disaster developed in some parts of West Bengal. In the eight districts of West Bengal, namely South 24 Parganas, North 24 Parganas, Nadia, Murshidabad, Malda, Burdwan, part of Howrah, Hooghly and Calcutta arsenic has been found in ground water above the maximum permissible limit of 0.01 mg./L as recommended by WHO due to geochemical contamination. The cillagers are using this

contaminated water for drinking, cooking and other household purposes. Due to long-continued consumption of this arsenic contaminated water, the local people are manifesting the various toxicological features of chronic arsenicosis.^{1,2,3} Although major arsenic incidents have occurred in Taiwan, Antofagasta in Chile, Mexico, and Argentina, the incidence in West Bengal is probably the biggest arsenic calamity in the world.^{3,4}

Apart from the various other preparations of arsenic, *Arsenicum album* is one of the important medicines in homoeopathic *Materia Medica*.

* Deptt. of Organon, National Institute of Homoeopathy, Kolkata

Hahnemann proved this medicine and included it in *Materia Medica Pura*.⁸ The sources of symptoms of arsenic album include the proving and the toxicological findings—both acute and chronic.^{6,7,8,9} Since the toxicological observations contributes a significant portion of symptoms of homeopathic *Materia Medica*, the present study was undertaken in order to confirm the symptoms of arsenic album already included in the *Materia Medica* and Repertory as well as to incorporate new symptoms and signs, if any for their further development.^{10,11}

Materials and Methods:

Patients

361 patients of chronic arsenic toxicity of various age group and of both sexes, who visited the Arsenic Treatment Center of National Institute of Homoeopathy at Asokenagar, Deganga in the district of 24 parganas (N) and Bamangram, Malda were included in the present study. The criteria for including the patient are as follows:

- Subjects having the history of drinking water containing arsenic above 0.01 mg./L at least for six months.
- Subjects having arsenic in hairs more than 1 mg/kg and nails above 1.08 mg./kg.

Methods

Flow Injection-Hydride generation-Atomic Absorption Spectrometry (FI-HG-AAS) was used for analysis of most of the water and digested biological samples like hairs and nails. For high concentration of arsenic in water, spectrophotometric method was used. The arsenic content in hairs were measured following the same method after digestion.^{1,2}

Sample collection and digestion

The persons visiting the arsenic treatment center are instructed to bring the sample of water they are consuming for drinking purpose. Samples of hairs and nails were collected from persons having the history of consuming arsenic contaminated water.

Toxicological study

Each case (person having the history of consuming water containing arsenic more than the maximum permissible limit of 0.01 mg/l as recommended by WHO for more than six months and the arsenic content in hairs is more than 1mg/kg and in nails above 1.08 mg/kg) was taken thoroughly following Hahnemannian method as envisaged in *Organon of Medicine*.¹⁰ The symptoms present before consuming arsenic contaminated water were excluded, while the symptoms developed after consuming arsenic contaminated water were considered as the toxicological symptoms of arsenicum album. Moreover, if any previous complaints were aggravated after consuming arsenic contaminated water, those complaints were also considered as the toxicological symptoms of arsenicum album. The symptoms thus collected were then compared with the Synthesis Repertory, Hering's Guiding Symptoms, Allen's Encyclopedia and A Drug Pathogenesis by Hughes and Dake to confirm the existing symptoms of arsenicum album as well as to identify the new symptoms and signs not mentioned in the said Repertory and *Materia Medica*.

Results

361 patients of chronic arsenic toxicity were included in the study. Demographic data of the patients investigated are given in Table 1.

Table 1: Age and sex distribution of 361 patients of chronic arsenic toxicity

| Age (years) | Male | | Female | |
|---------------------------|------|-------|--------|-------|
| | No. | % | No. | % |
| Below 10 | 6 | 2.78 | 3 | 2.07 |
| 11 to 20 | 24 | 11.11 | 20 | 13.79 |
| 21 to 30 | 51 | 23.61 | 32 | 22.07 |
| 31 to 40 | 62 | 28.70 | 49 | 33.79 |
| 41 to 50 | 37 | 17.13 | 28 | 19.31 |
| 51 to 60 | 20 | 9.26 | 12 | 8.27 |
| Above 60 | 16 | 7.41 | 1 | 0.69 |
| Total No. of Patients 361 | 216 | 100.0 | 145 | 100.0 |

Out of these 361 patients, 49.76% patients are manifesting the symptoms of mind, 93.07% skin, 56.51% of respiratory system, 45.51% of gastrointestinal symptoms, 11.08% of cardiovascular symptoms, 30.19% of general symptoms. A comparison of the symptoms collected in the present study and symptoms already included in the "Synthesis" repertory is presented in Table 1. The comparative study showed that out 89 symptoms collected in the present clinical study, arsenicum album was included under the corresponding rubrics of 57 symptoms, while against rest of the 32 symptoms arsenicum album was not mentioned (Table-2).

Table 2: Comparison between the symptomatology of patients of Chronic Arsenic Toxicity as observed in the present study and the existing rubrics of the Synthesis repertory

Symptomatology of the present study

Synthesis Repertory

MIND

1. Irritable
2. Desires company
3. Anxious feeling
4. Weakness of memory
5. Fear of various things

Mind, Irritability: Ars (4)
 Mind, Company, desire for: Ars. (3)
 Mind, Anxiety: Ars. (4)
 Mind, Memory, weakness of memory: Ars. (3)
 Mind, Fear: Ars.(3)

HEAD

1. Vertigo
2. Pain in forehead especially left>cold application

3. Pain over the vertex < exposure to sun
4. Vertigo with nausea

Vertigo: Ars.(2)
 Head, pain, forehead, sides, left side: Not available
 Head, Pain, cold application, amelioration: Ars.(2)
 Head, Pain, vertex: Ars.(1)Heat, Pain, Sun from exposure to: Not available
 Vertigo, Nausea, with: Ars.(1)

EYES

1. Eyes painful with sensation as if eyes would burst through the socket
2. Photophobia
3. Redness of eyes especially in children
4. Watering from eyes

Eyes, Pain, bursting: Not available
 Eyes, Photophobia: Ars.(3)
 Eyes, Discoloration, red: Ars.(3)
 Eyes, Lachrymation: Ars.(2)

NOSE

1. Recurrent attacks of sneezing
2. Watering from Nose
3. Epistaxis

Nose, Sneezing: Ars. (3)
 Nose, Discharge, Watery: Ars. (3)
 Nose, Epistaxis: Ars. (2)

MOUTH

1. Blackish pigmentation of tongue
2. Blackish pigmentation of buccal mucosa
3. Soreness of mouth
4. Cracked at the corners of the mouth
5. Offensive breath

Mouth, Discoloration, Tongue, black: Ars. (2)
 Rubric not found
 Mouth, Pain, sore: Ars. (2)
 Face, Cracked, Mouth, corners of: Not available
 Mouth, Odor, offensive: Ars. (3)

STOMACH & ABDOMEN

1. Flatulence
2. Hunger intolerance
3. Irregularity in bowel movement
4. Thirst for large quantities of water
5. Frequent urging with mucoid stool

6. Anorexia
7. Nausea especially while eating or looking at the food

8. Pain in upper abdomen < empty stomach
9. Protrusion of piles during each stool with bleeding

Abdomen, Flatulence: Ars. (3)
 General, Fasting, agg: Ars. (1)

 Stomach, Thirst, large quantity: Ars. (3)
 Stool, Frequent: Ars. (3)
 Stool, Mucus with: Ars. (2)
 Stomach, Appetite, wanting: Ars.(3)
 Stomach, Nausea, food, looking at, on: Not available
 Stomach, Nausea, eating while: Not available
 Abdomen, Pain, eating, amel: Not available
 Rectum, Protrude, stool, during: Ars. (1)
 Rectum, Haemorrhage, stool, during: Not available



Fig.1: Diffuse hypo and hyper pigmentation on the back of a patient of Chronic Arsenic Toxicity



Fig. 2 : Rain drop pigmentation (presence of both hypo and hyper pigmentation) with keratosis of both palm and sole in a CAT patient aged 12 years who ultimately died



Fig. 3 : Hyperkeratosis on both soles of a CAT patient



Fig.4 : Hyperkeratosis on palms of a CAT patient

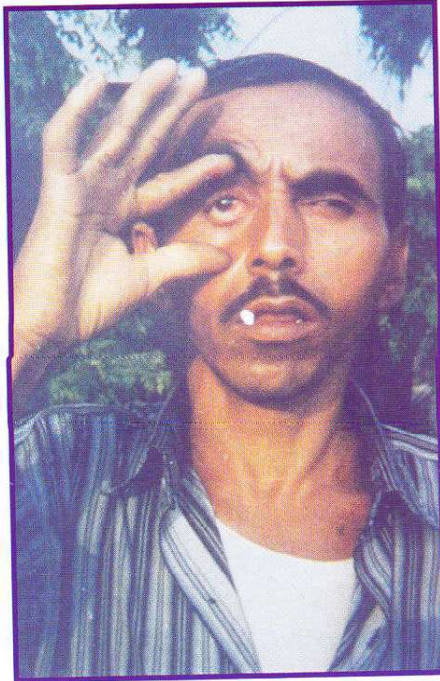


Fig. 5 : Redness of the eyes of a CAT patient



Fig. 6 : Non-pitting oedema of left leg of a CAT patient



Fig. 7 & 8 : Shows two children who are brother and sister affected by Arsenic Toxicity

Fig. 9 : Ulcer on several parts of the body of a CAT patient who ultimately died due to skin cancer

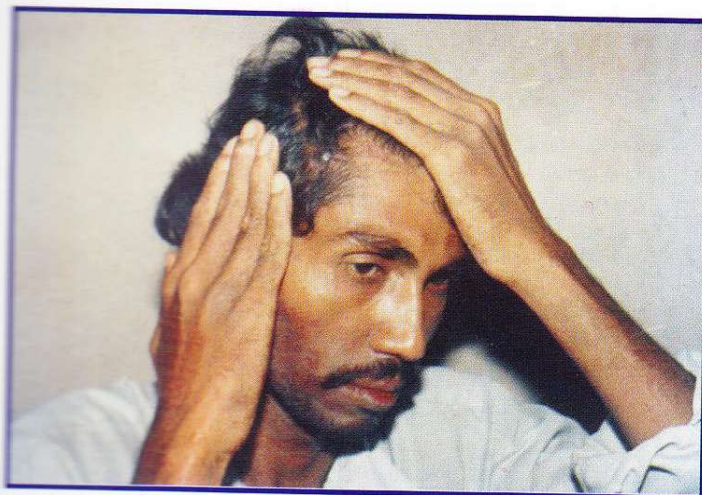


Fig. 10 : Intraepidermal epithelioma (Bowen's Disease) of a CAT patient

Fig. 11 Shows a family affected by Chronic Arsenic Toxicity



10. Sour taste
11. Sour eructation
12. Burning pain in the stomach

URINARY SYSTEM

1. Frequent urging for urination
2. Burning in urethra before, during and after urination
3. Offensive urine
4. Inability to hold the urge
5. Takes long time to urinate
6. Urine passes in split
7. Haematuria
8. Discharge of whitish mucus from urethra

RESPIRATORY SYSTEM

1. Recurrent attack of dry cough < at night
2. Cough with profuse expectoration
3. Cough < winter
4. Difficult in breathing < night
< lying down
< change of weather
5. Palpitation < by exertion
< mental excitement
6. Heaviness in chest with cough < at night
7. Haemoptysis of bright red blood
8. Pain in chest during coughing

EXTREMITIES & BACK

1. Wart-like nodule with or without pain over palms and soles
2. Burning of palm and soles
3. Thickening of palm and soles with roughness
4. Itching of soles
5. Pain in different joints with soreness
6. Non-healing ulcer over palms, soles and other parts of the body
7. Swelling of feet – pitting edema
8. Unilateral non-pitting edema of feet

REPRODUCTIVE SYSTEM

1. Irregular menses
2. Menstruation painful
3. Sexual debility
4. Blackish, offensive menses

Mouth, Taste sour: Ars (2)
Stomach, Eructation, type of sour: Ars (2)
Stomach, Pain, burning: Ars (3)

Bladder, Urination, frequent: Ars (1)
Urethra, Pain, burning, before : Not available
Urethra, Pain, burning, during: Ars. (1)
Urethra, Pain, burning, after: Not available
Urine, Odor, offensive: Ars. (2)
Bladder, Urging to urinate, irresistible (see Sudden), Sudden: Not available
Bladder, Urination, retarded, must wait for urine to start: Not available
Bladder, Urination, forked stream: Not available
Urine, Bloody: Ars. (3)
Urine, Mucus in urine (see Sediment-mucus)
Sediment-Mucus: Ars. (1)

Cough, Dry, night: Ars. (3)
Expectoration, Copious: Ars. (3)
Cough, Seasons, winter, in the: Ars. (1)
Respiration, Difficult, night: Ars.(3)
Respiration, Difficult, lying: Ars. (3)
Respiration, Difficult, weather, change of: Not available
Chest, Palpitation of heart, exertion: Ars. (3)
Chest, Palpitation of heart: excitement, after: Ars (2)
Chest, Oppression, coughing, when: Ars (1)
Chest, Oppression, coughing, night: Not available
Expectoration, Bloody: Ars (3)
Chest, Pain, cough, during: Ars (1)

Extremities, Nodules, Lower limbs: Not available
Extremities, Pain, burning, Hand, Palm: Ars (1)
Extremities, Pain burning, Foot, Sole: Ars (1)
Extremities, Thick, skin, Feet, Soles: Ars (3)
Extremities, Thick, skin, Hand, Palm: Not available
Extremities, Roughness: Not available
Extremities, Itching, Foot, soles of: Not available
Extremities, Pain, Joints: Ars. (2)
Extremities, Pain-sore, bruised, joints: Not available
Extremities, Ulcer, Foot, Soles: Ars.(2)
Extremities, Ulcer, Hand, Palm: Not available
Extremities, Swelling, Foot: Ars.(3)
Extremities, Swelling, Foot, one foot only: Not available

Female Genitalia, Menses, irregular: Not available
Female Genitalia, Menses, painful, dysmenorrheal: Ars.(2)
Male, Sexual, wanting: Not available
Female, Sexual desire, wanting: Not available
Female Genitalia, Menses, Offensive: Ars.(1)
Female Genitalia, Menses, black: Not available

SLEEP & DREAMS

1. Disturbed sleep
2. Easily awakened from sleep
3. Dreams of dead persons
4. Fearful dreams
5. Patient always feels sleepy

Sleep, Disturbed: Ars.(2)
Dream, Dead, of the: Ars.(3)
Dream, Frights: Not available
Sleep, Sleepiness: Ars.(3)

SKIN

1. Both Hypo and Hyper pigmented spots over whole body
2. Hypopigmented spots over the whole body
3. Hyperpigmented spots over body

4. Exfoliating skin eruption < bathing
5. Itching of whole body
6. Urticaria like eruption with itching
7. Malignant ulcer over skin
8. Diffuse black spots on several parts of the body – Melanosis

Rubric not found

Skin, Discoloration, white: Ars.(3)
Skin, Discoloration, black, spots: Ars.(2)
Skin, Eruption, scaly: Ars.(3)
Skin, Itching: Ars.(3)
Skin, Eruption, urticaria: Ars.(3)
Skin, Ulcer, Malignant: Not available
Skin, Discoloration, blackish: Ars.(3)

GENERAL

1. Tendency to catch cold easily
2. Chilly patient
3. Delayed healing of wounds

4. Profound debility
5. Burning of whole body
6. Hot Patient
7. Gradual emaciation
8. Profuse perspiration
9. Offensive perspiration
10. Marked pallor
11. Generalised bodyache < at night
12. Trembling of whole body
13. Irregular fever especially in the evening and night

General, Cold, take cold, tendency to: Ars.(1)
General, Head, lack of vital heat: Ars.(2)
General, Wounds, heal, tendency to slowly: Ars.(1)
General, Weakness: Ars.(3)
General, Pain, burning externally: Ars.(3)
General, Warm, agg: Not available
General, Emaciation: Ars.(3)
Perspiration, Profuse: Ars.(3)
Perspiration, Odor, offensive: Ars.(2)
General, Anemia: Ars.(3)
General, Pain, night, agg: Not available
General, Trembling, externally: Ars.(3)
Fever, Irregular, stages: Ars.(3)Fever, Evening: Ars.(2)
Fever, Night: Ars.(2)

Table 3: Symptoms not included in Synthesis repertory, but observed in the present study

1. Pain in forehead esp. left side.
2. Pain over the vertex < exposure to sun.
3. Eyes painful with sensation as if eyes would burst through the socket.
4. Blackish pigmentation of buccal mucosa.
5. Cracked at the corner of the mouth.
6. Nausea feeling especially when eating.
7. Nausea feeling on looking at the food.
8. Pain in the upper abdomen < empty stomach.
9. Haemorrhage from piles.
10. Burning in the urethra before urination.
11. Burning in the urethra after urination.
12. Inability to hold the urge for urination.
13. Takes long time for urinate.
14. Urine passes in split stream.
15. Difficulty in breathing < change of weather.
16. Heaviness in chest with cough < at night.
17. Wart-like nodules with or without pain over palm and soles.
18. Thickening of palm.
19. Roughness of palm and soles.
20. Itching of soles.
21. Soreness in different joints.
22. Non healing ulcers over palm.
23. Irregular menses.
24. Sexual debility.

25. Blackish menses.
26. Easy awaking from sleep.
27. Fearful dreams.
28. Hypo and Hyper pigmented spots over the whole body.
29. Malignant ulcer of skin.
30. Generalized bodyache < at night.
31. Hot patients.

The results of the comparative study between the above group of symptoms (symptoms not mentioned in Synthesis repertory, but found in the present study) and Hering's Guiding symptoms were shown in Table 4.

Table 4: Comparative study between the symptoms not included in Synthesis repertory, but observed in the present study and the symptomatology of arsenicum album in Hering's Guiding Symptoms.

| Symptoms not included in Synthesis Repertory | Symptoms included in Hering's Guiding Symptoms under Arsenicum album |
|--|--|
| 1. Pain in forehead esp. left side.Side (p-40) | The pain in head and face is especially severe on it. |
| 2. Pain over the vertex < exposure on sun | Absent |
| 3. Eyes painful with sensation as if eyes would burst through the socket | The eyes feels as if they had no room in the orbit (p-42) |
| 4. Blackish pigmentation of buccal mucosa | Not available |
| 5. Nausea feeling especially when eating | Not available |
| 6. Nausea feeling even on looking at the food | Not available |
| 7. Cracked at the corner of the mouth | Not available |
| 8. Pain in the upper abdomen < empty stomach | Not available |
| 9: Haemorrhage from piles | Hemorrhoids with bleeding (p-63). |
| 10. Burning in the urethra before urination | Not available |
| 11. Burning in the urethra after urination | Not available |
| 12. Inability to hold the urge for urination | Not available |
| 13. Urine passes in split stream | Not available |
| 14. Difficulty in breathing < change of weather | Changes of weather and cold; oppressed breathing (p-85) |
| 15. Heaviness in chest with cough < at night | On lying down at night, feels an oppression of chest, breathing becomes short, is obliged to sit up in bed < after midnight (p-68) |
| 16. Thickening of palm | Not available |
| 17. Soreness in different joints | Not available |
| 18. Itching of soles | Not available |
| 19. Unilateral non-pitting edema of the feet | Not available |
| 20. Non healing ulcer over palm | Not available |
| 21. Roughness of palm and soles | Not available |
| 22. Painful non-healing ulcers over palm, sole and other parts of the body | Skin rough, dry and dirty looking (p-98) Painful sensitiveness of old ulcers (p-10) |
| 23. Irregular menses | Not available |
| 24. Takes long time to urinate | Not available |
| 25. Sexual debility | Sexual power lost (p-64) |
| 26. Blackish menses | Menses too often and venous; Sudden profuse discharge of black blood (p-66) |
| 27. Easy awaking from sleep | Not available |
| 28. Fearful dreams | Dreams: full of care, sorrow and fear (p-82) |
| 29. Hypo and Hyper pigmented spots over the whole body | Dark-brown color of whole body; Brownish white spots on skin (p-99) |
| 30. Wart-like nodules with or without pain over palm and soles | Not available |
| 31. Generalized body ache < at night | Not available |
| 32. Hot patient | Not available |

The group of symptoms not mentioned in Synthesis repertory and Hering's Guiding Symptoms are shown in Table 5.

Table 5: Symptoms neither included in Synthesis, nor in Hering's Guiding Symptoms, but observed in the present study.

1. Blackish pigmentation of buccal mucosae.
2. Nausea feeling especially when eating.
3. Nausea feeling even on looking at the food.
4. Pain in the upper abdomen < empty stomach.
5. Cracked at the corner of the mouth.
6. Burning in the urethra before urination.
7. Burning in the urethra after urination.
8. Urine passes in split stream.
9. Inability to hold the urge for urination.
10. Takes long time to urinate.
11. Thickening of palm.
12. Itching of soles.
13. Unilateral non-pitting edema of the feet.
14. Wart-like nodules with or without pain over palm and soles.
15. Soreness in different joints.

Further comparison with the symptoms of Allen's Encyclopaedia showed that out of the above group of symptoms, 2 symptoms were included in Allen's Encyclopaedia under arsenicum album (Table-6).

Table 6: Comparative study between the symptoms not included in Synthesis, Hering Guiding Symptoms and Allen's Encyclopaedia

| Symptoms not included in Synthesis Repertory | Symptoms included in Allen's Encyclopaedia under Arsenicum album |
|--|---|
| 1. Pain over the vertex < exposure to sun | Pain in the region of the vertex (p-503) |
| 2. Generalized body ache < at night | Pain all over, Pains in the whole body, mostly in the evening (p-539) |
| 3. Blackish pigmentation of buccal mucosa | Not available |
| 4. Nausea feeling especially when eating | Not available |
| 5. Nausea feeling even on looking at the food | Not available |
| 6. Pain in the upper abdomen < empty stomach | Not available |
| 7. Cracked at the corner of the mouth | Not available |
| 8. Burning in the urethra before urination | Not available |
| 9. Burning in the urethra after urination | Not available |
| 10. Urine passes in split stream | Not available |
| 11. Inability to hold the urge for urination | Not available |
| 12. Takes long time to urinate | Not available |
| 13. Thickening of palm | Not available |
| 14. Itching of soles | Not available |
| 15. Unilateral non-pitting edema of the feet | Not available |
| 16. Wart-like nodules with or without pain over palm and soles | Not available |
| 17. Soreness in different joints | Not available |
| 18. Irregular menses | Not available |
| 19. Easy awaking from sleep | Not available |
| 20. Hot patient | Not available |

"A Cyclopaedia of Drug Pathogenesis" by Richard Hughes and Dake was also consulted, but no other symptom, which are not included in Synthesis repertory, Hering Guiding Symptoms, Allen's Encyclopaedia was found to be present in this Materia Medica under arsenicum album.

Hence, the group of symptoms not included either in Synthesis repertory, or Hering's Guiding Symptoms or Allen's Encyclopaedia or "A Cyclopaedia of Drug Pathogenesis" by Richard Hughes and Dake, but observed in the present study were shown in Table 7.

Table 7: Symptoms not included in Synthesis, Hering's Guiding Symptoms, Allen's Encyclopaedia and or "A Cyclopaedia of Drug Pathogenesis" by Richard Hughes and Dake, but observed in the present study.

1. Blackish pigmentation of buccal mucosae.
2. Nausea feeling especially when eating.
3. Nausea feeling even on looking at the food.
4. Pain in the upper abdomen < empty stomach.
5. Cracked at the corner of the mouth.
6. Burning in the urethra before urination.
7. Burning in the urethra after urination.
8. Urine passes in split stream.
9. Inability to hold the urge for urination.
10. Takes long time to urinate.
11. Thickening of palm.
12. Itching of soles.
13. Unilateral non-pitting edema of the feet.
14. Wart-like nodules with or without pain over palm and soles.
15. Soreness in different joints.
16. Irregular menses.
17. Easy awaking from sleep.
18. Hot patient.

Discussion

The comparison between the clinical features of patients of Chronic Arsenic Toxicity and the rubrics of the Synthesis Repertory showed that out of 89 symptoms, arsenicum album was mentioned in Synthesis repertory against only 57 symptoms. But it was not mentioned under rest of the 32 symptoms. This group of symptoms may be considered for inclusion in Synthesis for its further development.

Among the above 32 symptoms, 18 symptoms were absent both in Repertory and Materia Medica. Hence these new group of symptoms first observed in this study may be considered for inclusion in both Repertory and Materia Medica. The present study also proved the existing validity of 71 symptoms already mentioned both in Repertory and Materia Medica.

However, inclusion of these new symptoms again needs further clinical confirmation to establish their validity as well as their comparative value. Since such toxicological observations may be the combined effect of some other pollutants existing along with the arsenic in the drinking water as well as some individual factors (like nutrition and factors in relation to their life style), the need of clinical confirmation has enhanced further.

Acknowledgement

This work was financially supported by an extramural research grant from the Dept. of Indian System of Medicine and Homoeopathy, Ministry of Health & Family Welfare, Govt. of India, which is sincerely acknowledged. The authors are grateful to Dr. S.P. Singh and Dr. Iswara Das of Department of ISM and H for their continuous encouragement. Authors also thank to Dr. D. Basu, Director, NIH; Dr. S.K. Bhattacharya, Dr. L.M. Khan; Dr. L.K. Pradhan for extending their cooperation and

valuable guidance for this study time to time as the Director of NIH and personally. We thank all the patients for their active participation.

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