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Case Report

Ayurvedic approach for management of Wilson's disease: A case report

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ABSTRACT

Wilson's disease betides due to mutation in ATP-7B that leads to snagging in copper transport by the hepatic lysosomes resulted in the deposition of copper in the brain, liver, kidney or skeletal system. The symptoms are jaundice, edema in legs, ascites, Kayser-Fleischer rings, dysarthria, dysphagia, ataxia, dyskinesia, and muscle spasticity. Current therapeutic modalities for the management of Wilson's disease include zinc, trientine, penicillamine and ammonium tetrathiomolybdate. A 12 year old child diagnosed with Wilson's disease came with complaints of inability to speak, difficulty in swallowing and generalized stiffness for 6 months. His investigations showed SGPT 43 U/L, Ceruloplasmin 0.03 g/L, urine copper level 225.03 μg per 24 h, a chronic parenchymal disease in the liver and splenomegaly. According to *Ayurveda*, this case of generalized stiffness with hepatomegaly and splenomegaly was correlated with *Agnimandya* at the *Dhatu* level that led to *Vatavyadhi*, *Yakrutodara*, and *Plihodara*. The treatment mentioned for *Vatavyadhi* is *Snehana* (oleation), *Mrudu Swedana* (mild sudation), *Anuvasana Basti* (oil enema) and for *Yakrutodara* and *Plihodara* is *Niruha Basti* (Decoction Enema) and *Anuvasana Basti* (oil enema). The case was treated with *Abhyanga*, *Swedana*, *Basti* and oral medication. After treatment, the symptoms were reduced and he was able to extend both lower limbs completely. His urinary copper level came to normal (47.01 μg per 24 h), so, it can be concluded that *the Ayurvedic* approach and diet modifications in such patients may help in providing supportive care and improving the quality of life.

1. Introduction

Wilson's disease (WD) is an inherited disease of fallacious copper metabolism caused due to mutation in *ATP7B*, a copper-binding protein, which leads to deviant accumulation of copper in hepatocytes that further spills into circulation and eventually gets deposited in other organs [1, 2]. WD may present as hepatic, neurologic or psychiatric problems [3]. Its prevalence is around 0.5 cases per 100,000 inhabitants [4, 5] with 0.56% gene frequency and 1 in 90 carrier frequency [6].

According to Walshe, *the clinical characteristics of two patients may vary even amid the common siblings of WD*, accentuating its diverse manifestations [7]. The symptoms can include fatigue, anorexia, jaundice, Kayser-Fleischer rings, edema in legs, ascites, dysarthria, dysphagia, ataxia, dyskinesia and muscle spasticity [3, 8, 9]. Abnormally low ceruloplasmin level less than 5 mg/dL is discerned as the first step in the diagnosis of WD and 24-h copper values more than 100 μg/24 h are usually appraised as diagnostic criteria of WD [9]. Many drugs like zinc, trientine, penicillamine, and ammonium tetrathiomolybdate have a beneficial effect and are commonly recommended in the management [10]. However, liver transplantation is the only successful treatment in advanced liver disease with decompensated cirrhosis or fulminant liver failure because of the impede in the efficacy of anti-copper medications [11–13].

2. Presenting complaints

A 12 year old boy, diagnosed with Wilson's disease, from non-consanguineous marriage reported in October 2017 with complaints of inability to speak, sit, move upper and lower limbs, difficulty in swallowing and generalized stiffness for 6 months. The patient was said to be healthy 6 months back and then gradually developed stiffness and weakness over the left side of the body. Zinc acetate 50 and Trihexyphenidyl tab was advised to the patient for 4 months but didn't get an improvement rather than the stiffness also developed over the right side of the body, so the

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treatment was stopped and the patient was brought to seek *Ayurvedic* management (Table 1 in the supporting information).

3. Clinical findings

The Patient was said to attain developmental milestones at the appropriate age; with no prenatal, perinatal or postnatal complication and no history of prolonged high-grade fever or seizure. All other family members were healthy. MRI of the patient's brain showed diffuse T2 and FLAIR symmetrical hyperintense area and the possibility of systemic/metabolic cause versus neurodegenerative condition. USG whole abdomen (04/04/2017) showed nodular parenchymal appearance-chronic parenchymal disease in the liver and enlargement of 13 cm in the spleen. The blood investigations showed Hb 10.9 g/dL, SGPT 43 U/L, ceruloplasmin 0.03 g/L, serum copper level 104.3 ug/dL, urinary copper level 69.24 μg per litre and 225.03 μg per 24 h (Table 2 in the supporting information). Generalized stiffness was present over the whole body. The patient was able to extend the hip joints and knee joints only up to an angle of 65° and 30° respectively [Fig. 1(b) and (c)]. KF ring was present in both the eyes [Fig. 1(a)].

The patient was a vegetarian with a good appetite and disturbed sleep. The patient was suffering from chronic constipation, passing stool once in two days with normal bladder habits. He was thin built, poorly nourished and appeared with a masked face; no signs of lymphadenopathy, pallor or icterus. All vitals were in normal limits. The patient was conscious, well oriented with time, place and person, but irritable. His general intelligence and memory were intact. All cranial nerves were intact (except Optic and Accessory which were non-assessable). Whole-body showed muscle wasting and hypertonicity (generalized rigidity). The muscle power was non-assessable due to stiffness. Sensory examination was done with pinprick and light touch at 13 different sites [the upper arm's lateral aspect (C5), the shoulder's posterior aspect (C4), medial aspect of the lower arm's medial aspect (T1), pinky finger's tip (C8), middle finger's tip (C7), thumb's tip (C6), umbilical level (T10), thorax, nipple level (T5), the upper leg's lower-medial part (L3), the upper leg' upper part (L2), medial lower leg (L4), lateral lower leg (L5), sole of foot (S1)] and found to be intact, body temperature was normal. The plantar reflex was normal over the right foot and absent over the left foot due to stiffness. Other deep tendon reflexes were non-assessable due to rigidity.

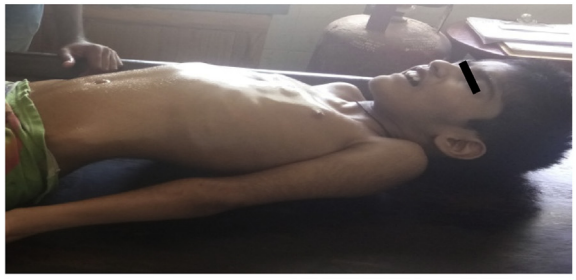
4. Diagnostic focus and assessment

The patient was diagnosed with Wilson's disease. After a thorough clinical examination, the condition seemed to be *Vatavyadhi* with *Yakrutodara* and *Plihodara* according to *Ayurveda*.

5. Therapeutic focus and assessment

A detailed therapeutic interventions undertaken was listed in Table 3 in the supporting information. Initially, *Deepana Pachana* was done for 5 days with *Trikatu Churna* [mix powder of *Pippali* (*Piper longum* Linn.), Shunthi (Zingiber officinale Rosc.) and Maricha (Piper nigrum Linn.)] 3 g thrice a day with lukewarm water. Thereafter, the treatment was planned as Sarvanga *Abhyanga* [14] with *Ksheerabala Taila* [15] followed by *Shastikashali* Sweda [14] [sudation with a bolus of *Shastikashali* rice (*Oryza Sativa* Linn.), roots of *Bala (Sida Cordifolia* Linn.) and milk] along with *Matra Basti* [16] with 30 mL *Ksheerabala Taila* once a day after lunch. *Gandhaka Rasayan* [17] 125 mg twice a day with lukewarm water, *Amrutarishta* [18] 5 mL thrice a day with lukewarm water, *Guduchi Satva* [19] 125 mg mixed with *Yashada Bhasma* (a Zinc based *Ayurvedic* metallic preparation) 50 mg thrice a day with honey was advised as

(a) Kayser-Fleischer ring (KF ring)-Brown ring around the corneo-scleral junction



(b) Presentation showing stiffness of back and neck

(c) Full body Presentation showing muscle wasting and generalized rigidity

Fig. 1. Clinical presentation before Treatment.

an oral medication. (Table 3 in the supporting information) The patient had advised avoiding seafood (especially shellfish), organ meats (e.g., liver), whole grains, legumes (e.g., beans and lentils), cereals, potatoes, peas, mushrooms, chocolate, nuts (including peanuts and pecans), tea, grains such as wheat and rye and fruits (coconuts, papaya and apples). A proper diet containing milk, *Ghee* and *Shashtikashali* rice was advised.

After 15 days of treatment, there was a 50% improvement in swallowing; the patient's urinary copper level reduced to 96.95 μg/24 h (Table 2 in the supporting information) and generalized stiffness reduced at the shoulder joints and lower limbs by 30%. Irritability reduced completely and appetite was improved.

So, treatment plan had been modified for better management and *Niruha Basti* [16] and *Lashunadi Ksheerapaka* [22] [25 mL Milk boiled with 100 mL of water and 6 g of drugs, including roots of *Bala (Sida Cordifolia* Linn.), *Guduchi* (*Tinospora Cordifolia* Thunb.), *Ashwagandha* (Withania Somnifera Linn.) and *Lashuna* (*Allium Sativum* Linn.) until whole water had evaporated and only 25 mL of milk remained] 25 mL once a day in the evening was introduced; *Karma Basti* containing 18 *Anuvasana Basti* [16] with 30 mL *Ksheerabala Taila* added to 30 mL *Ashwagandha Ghrita* [19] and 12 *Bala-Ashwagandha*di *Ksheera Basti* 120 mL (Table 4 in the supporting information) was added to the treatment plan.

The patient was discharged with *Cap Ksheerabala* 2 cap once a day in the morning with warm water, Mix powder 4 g with honey twice a day [mix powder of *Bhumyamalaki* (*Phyllanthus Niruri* Linn.), *Guduchi* (*Tinospora Cordifolia* Thunb.), *Katuki* (*Picrorhiza Kurroa* Royle ex Benth.) and *Bhringraj* (*Eclipta Prostrata* Linn.) 1 g

each], *Ksheerabala Taila* for application to whole body, *Amrutarishta* 5 mL thrice a day, *Guduchi Satva* 125 mg with honey thrice a day and *Gandhaka Rasayan* 125 mg thrice a day.

Then again, he was admitted for the second sitting of *Karma Basti* and the same treatment plan was followed.

6. Follow-up and outcomes

After the first sitting of 30 days of *Karma Basti* difficulty in swallowing and general irritability relieved completely, the patient's stiffness reduced, appetite improved and he was able to speak few monosyllabic words. His urine copper level was successfully reduced to 96.95 μg/24 h (Table 2 in the supporting information). The patient was able to extend hip joints and knee joints up to 130° and 100° respectively (Fig. 2a).

After the second sitting of *Karma Basti* (04/04/18), the patient's urinary copper level came to normal i.e. 47.01 μg/24 h (Table 2 in the supporting information) and a reduction was seen in generalized stiffness. The patient was able to extend the lower limbs completely. The patient was able to extend hip joints and knee joints up to an angle of 180° (Fig. 2b).

7. Discussion

Wilson's disease can't be correlated directly with any disease as per *Ayurveda* due to its diverse manifestation. In the present case, the generalized rigidity, hepatomegaly, and splenomegaly were correlated to *Vatavyadhi*, *Yakrutodara*, and *Plihodara*. The root cause of the manifested disease was *Agnimandya*. *Agnimandya* at the *Jatharagni* level further led to *Agnimandya* at the *Dhatvagni* level. This led to the blockage of channels and ultimately caused *Vata* vitiation and metabolic disorders. *Vatavyadhi* is *Vataja* disorder (occurred due to *Vata Dosha*) in which there is a contraction in body parts, stiffness, pain in the joints, rigidity at limbs, back, neck and head, insomnia, tremors, etc. [20] In *Vatavyadhi* both *Snayu* (nerves) and *Sira* (blood vessels) are afflicted by the aggravated *Vata* [20]. This further led to the development of complications like *Yakrutodara* and *Plihodara* along with *Vatavyadhi*. *Yakrutodara* and *Plihodara* are manifested by weakness, anorexia, indigestion, retention of stool and urine, prostration, emaciation, bad taste in the mouth, distension of abdomen and colic pain [20]. Initially to treat *Agnimandya Trikatu Churna* was given. Thereafter, *Abhyanga* with *Ksheerabala Taila* was planned along with Bala-*Ashwagandha Ksheera Basti* and *Ksheerabala Taila* mixed with *Ashwagandha Ghrita Anuvasana Basti* in *Karma Basti* pattern because for *Vataja* disorder *Snehana* (Oleation), *Swedana* (sudation) and *Basti* (Enema) have been mentioned as the best treatment. For *Swedana* mild *Sweda* opted in the form of *Shastikashali Pinda Sweda*.

Ksheerabala Taila and Shastikashali provide nourishment to the body and reduce vitiated *Vata*. *Stabdhata* (stiffness) was due to *Sheeta* (cold) *Ruksha* (dry) properties of *Vata*, *Shastikashali* is having *Snigdha* (unctuous) and *Bruhmana* (nourishing) effect, so, along with *Ushna* (hot) property of *Swedana* (sudation), it helped in pacifying *Vata Dosha* thus helped in relieving Stabdhata (stiffness) of the patient. *Niruha Basti* (Decoction enema) and *Anuvasana Basti* (oil enema) opted with the drugs that were having *Bruhmana* effect so it nourished the body and pacified Vata Dosha. *Lashuna Ksheerapaka* has been mentioned as Vatahara so Bala and *Ashwagandha were added in Lashuna Ksheerapaka* to increase its potency.

Shulvari is a synonym of *Gandhaka* which means an enemy of *Shulva* (copper) so it may be taken as an anti-copper. That's why *Gandhaka Rasayan* was advised. *Yashada Bhasma* is having zinc. Zinc's contrivance of action involves the stimulation of intestinal cell metallothionein, which obstructs copper absorption from the intestinal tract. It is typically used as maintenance therapy to prevent copper from building up again after treatment [21]. So, *Yashada Bhasma* was added with *Guduchi Satva*. For *Yakrutodara*, *Amrutarishta* and *Guduchi Satva* were advised. *Guduchi* plays a crucial role in the normalization of altered liver functions [22].

Ayurveda attributes a great role to diet as part of treatment. A proper diet containing milk, *Ghee* and *Shalishashti* rice was advised. The patient had advised to avoid dietary sources enrich in copper such as seafood (especially shellfish), whole grains, organ meats (e.g. liver), legumes (e.g. beans and lentils), cereals, potatoes, peas, mushrooms, chocolate, nuts (including peanuts and pecans), tea, grains such as wheat and rye and fruits (coconuts, papaya and apples).

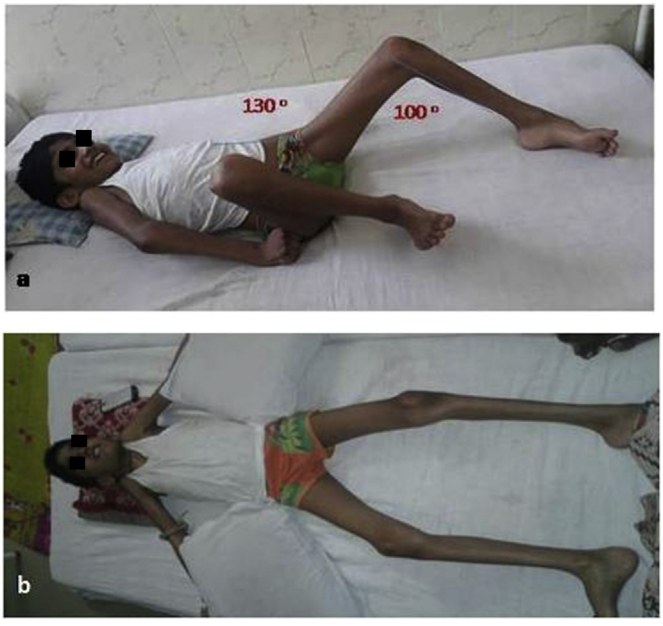


Fig. 2. Clinical presentation before Treatment (a) After first sitting of treatment, hip joints and knee joints extended up to 130° and 100° respectively. (b) After second sitting of treatment, hip joints and knee joints extended up to an angle of 180°.

8. Conclusion

Ayurvedic approach and diet modification have shown good results in reducing symptoms. The patient's appetite was improved, he was able to speak a few monosyllabic words, difficulty in swallowing and irritability relieved completely. The urine copper level came to normal and improvement was seen in generalized stiffness as both the lower limbs were able to extend completely. Albeit with a single case study it can't be stated that this is the effective management for WD but *the Ayurvedic* approach of proper assessment of *Dosha*, *Dushya* and diet modifications may help in providing supportive care and improving the quality of life in such patients.

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Conflict of interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jaim.2019.09.004.

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