

## Basic Research on the Herb *Tephrosia purpurea* (L) Pers.- the Translational Challenges – A Review

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### ABSTRACT

Out of the many molecules and formulations that go through the different phases of clinical trials, many a few fail in between, and the very few that complete the trials successfully are of herbal origin. For example cur cumin completed phase 3 trials in the United States. These are the times of herbal renaissance. We need to explore the nature's bounty for our benefit. A lot of research is going on in this direction. *Tephrosia purpurea* (L) Pers. is one such herb. Despite the volume and enormity of work carried out on this plant, the translational outcome is very poor. The reasons behind this deficit have to be identified and addressed. It is a constituent of many Ayurvedic formulations used for liver protection and regeneration.

**Keywords:** Herbal drugs, *Tephrosia purpurea*, Translational deficit.

### INTRODUCTION

*Tephrosia purpurea* is a self generating erect or spreading perennial herb found throughout India. It can be found as an ingredient in traditional herbal formulations. Whole plant may be used for its rich flavonoid and polyphenol content. Though a lot of research is going on in the plant, it is used only for its traditional claim in ayurveda. Hepatocytes may show apoptotic changes due to reasons like alcoholism, hepatitis, use of hepatotoxic drugs etc. Use of liver restoratives and

correctives is part of the regimen for liver diseases. *Tephrosia purpurea* is an important ingredient of these liver tonics. It is a plant with great research interest and a number of articles and papers have been published on the other potentials of this herb. This article tries to review the literature on the plant *Tephrosia purpurea* and highlight the possible reasons behind the poor translational outcomes from research and how do we address those reasons<sup>1,2</sup>.

**Table 1: Important Research Papers Published In Preclinical Studies on *Tephrosia Purpurea***

Part Used	Effect observed	Work done by
Roots	Anti ulcer activity <sup>3</sup>	Deshpande etal 2003
Roots	Anti carcinogenic and antilipid per oxidative <sup>4</sup>	Kavitha etal 2006
Roots	Ant-inflammatory and analgesic <sup>5</sup>	Gopalakrishnan etal 2010
Roots	Ameliorates CCl4 induced hepatic damage <sup>6</sup>	Sangeetha etal 2010
Roots	In-vitro anti oxidant <sup>7</sup>	Rumit Shah etal 2010
Roots	Anti-pyretic,anti-inflammatory <sup>8</sup>	Valli etal 2011
Roots	Antilithiatic <sup>9</sup>	Swathi etal 2008
Roots	Antiulcer <sup>10</sup>	Parmar etal 1998
Roots	Cytotoxic <sup>11</sup>	Sandhya etal 2011
Roots	Antimicrobial against acne inducing bacteria <sup>12</sup>	Kumar etal 2007
Roots	CNS depressant and analgesic <sup>13</sup>	Valli etal 2011
Leaves	Antihyperlipidemic <sup>14</sup>	Rashid etal 2011 <sup>14</sup>
Aerial parts	Healing of burn wound <sup>15</sup>	Santram etal 2010
Leaves	Ameliorates benzoyl peroxide induced cutaneous toxicity <sup>16</sup>	Mohammad etal 2009
Leaves	Alleviates phorbol ester induced tumour promotion <sup>17</sup>	Saleem etal 2001
Leaves	Attenuates pain and inflammation <sup>18</sup>	Vishal etal 2011
Leaves	Hepatoprotective <sup>19</sup>	Jain etal 2010
Leaves	Anti H.pylori <sup>20</sup>	Annalakshmi etal 2009
Leaves	Nephroprotective and curative <sup>21</sup>	Jain etal 2009
Seeds	Antihyperglycemic and antihyperlipidemic <sup>22</sup>	Pavana etal 2007
Aerial parts	Hepatoprotective <sup>23</sup>	Murthy etal 1993
Whole plant	Ameliorates diethyl nitrosamine and pot.bromate mediated renal oxidative stress <sup>25</sup>	Khan etal 2010
Whole plant	Effect on <i>status epilepticus</i> and oxidative stress <sup>26</sup>	Asuntha etal 2010
Whole plant	A source of beta sitosterol anti carcinogenic and anti hypercholesterolemic	Kishore etal 2011 <sup>27</sup>
Whole plant	Inhibition of mast cell degranulation and haemolysis <sup>28</sup>	Gokhale etal 2000
Whole plant	Antimicrobial <sup>29</sup>	Dabur etal 2007
Flower	Antibacterial ,antiviral	Kokila etal 2010 <sup>30</sup>
Whole plant	Antileishmanial	Preeti etal <sup>31</sup>

Only a few articles have been included in this article and the actual number of papers is manifold confirming and reconfirming the results using different tools and procedures. Research on the same plant by different scholars at different localities helps to generate data which by itself validates the results. Studies have to be directed in such a way that the distance between the lab and the patient is reduced.

The relationship between traditional herbalism and modern phytotherapy and the interface between academia and pharmaceutical industry must be cautiously and effectively negotiated. A synthesis of traditional herbal knowledge and modern research will benefit the patients at large. The right part of the plant harvested at the right time ,prepared properly ,utilising most

appropriate pharmaceutical techniques is important in determining the therapeutic efficacy of the final product. Use of isolated constituents may increase or decrease its effectiveness.

The constituents of *Tephrosia* include alkaloids, saponins, glycosides, Tannins, flavonoids etc. Some of the constituents may have direct activity and the other inert substances may increase bioavailability, reduce toxicity, or stimulate the action via a synergistic activity. Sometimes the isolated constituent- containing preparation may be stronger than the whole plant. Herbals like *Tephrosia purpurea* can be useful in many chronic degenerative or mild to moderate functional ailments, can also have an important role to play in recovery from serious illness reducing the recovery time. Allopathic medicine

and herbal drugs working in concert offer the virtues of both the systems and patient is the beneficiary of this relationship. There is an immediate need to rely on "Vis Medicatrix Naturae" or the healing power of nature especially for the prevention and management of diseases that are progressive in nature. We are on death for disease modifying drugs.

There is immense hope in generating data from traditional systems and

accumulated folk wisdom and that makes the basis for modern therapeutic regimens using many of the same herbs. Drugs like Rezulin and Propulsid were removed from market after approval by FDA because of serious adverse effects and untimely death of patients must be an eye opener. Herbal drugs have the benefit of the long history of human use and many years of use within the general population. There is a substantial record of safety or danger, effectiveness or lack of it.

**Table 2: Some of The Marketed Products Containing *Tephrosia Purpurea* For Clinical Use**

Product	Manufactured by	Form and content of <i>Tephrosia Purpurea</i> Extract	Uses
G-LIV-D.S Syrup	Morpheme Remedies	Syrup contains 200mg/200ml	Liver corrective and restorative
Stimuliv	FrancoIndia Limited	Sugar coated tablet contains 100mg	For supportive treatment in viral hepatitis, drug induced and alcoholic hepatitis
Dilapsin	Solumiks	100mg/tablet,100mg/ml syrup	Digestive, improves appetite, relieves flatulence
Safi	Hamdard Laboratories	Syrup contains 18.06mg/5ml	Skin diseases like acne vulgaris ,skin rashes and blemishes ,boils
Vimliv Fortified syrup	Solumiks herbaceutical products	25mg/5ml of syrup	Comprehensive liver tonic
Vasuliv syrup	Vasu pharmaceuticals	12mg/10ml syrup 360mg/tablet	Liver corrective and protective
Hibril oil	Vital care Pvt Ltd	1% Hair oil	Relieves stress and provides cooling effect. Induces sleep
Janduna capsules	AjmeraPharmaceuticals Pvt Ltd	Capsule contains 50 mg	UT infection, expels urinary stones. Relieves burning micturition.UT anti-infective.
Livina syrup (Darbar etal)	Deys Medical Stores Mfg,Ltd	50mg/tablet,100mg/5ml syrup	Hepatitis due to virus, jaundice
Stomyne capsules	Eisen Pharmaceutical Co Pvt Ltd	50mg/capsule	UT infection,UT anti-infective
Tefroliv	TTK HEALTHCARE LTD	60mg/5ml syrup,120mg/tablet	Acute and chronic hepatitis, liver cirrhosis.
NewLivfit (Y K Gupta etal)	NLF	SYRUP	Management of hepatitis B in end stage renal disease.
Livex	Ban	Drops,syrup,tablet,capsule Contains 5mg in syrup and capsule	Liver corrective ,protective and regenerative
Hepjaun	S.G Phytopharma Pvt Ltd	Syrup, Capsules	Hepatitis and jaundice

**Tephrosia Purpurea in Ayurveda**

Tephrosia purpurea containing formulations are prescribed in ayurveda mainly as liver correctives and restoratives. They contain aqueous or alcoholic extracts of Tephrosia purpurea. They are found to be effective in treating various disorders like.<sup>32, 33, 34,</sup>

1. Alcoholic liver cirrhosis
2. Viral hepatitis
3. Pre-cirrhotic conditions
4. Protein energy malnutrition
5. Radiation and chemotherapy induced liver damage
6. As an adjuvant with hepatotoxic drugs like antitubercular drugs
7. Urinary tract anti-infective
8. Antibacterial in acne vulgaris and acts as a blood purifier

Though tephrosia is just one of the many ingredients of these formulations, it supports the effects of other herbs and produces a synergistic effect that potentiates the effect of the final product. The volume of work in the preclinical studies on the various other therapeutic aspects of the plant drug is not translated into useful products though we have a number of articles confirming the results of different studies. More studies have to be directed towards generating data regarding the pharmacodynamic and pharmacokinetic aspects of the drug.

**Reasons behind translational deficit<sup>35</sup>**

1. The fact that herbs are rarely patentable.
2. Pharma companies unwilling to invest their time and money to run clinical trials on herbal drugs.
3. Inadequate knowledge regarding the pharmacodynamic and pharmacokinetic aspects of the plant Tephrosia purpurea.
4. Methodological flaws in animal studies.
5. Inadequate understanding of pathophysiology and biology.
6. Lack of sufficient knowledge regarding the molecular and biochemical pathogenesis of diseases.

**How do we solve the problem of translational deficit?<sup>36</sup>**

1. Encourage inter system collaborative team work.
2. Rely more on observational therapeutics and reverse pharmacology.
3. Create an R&D network correlating the fields of modern medicine, Indian systems of medicine and pharmaceutical sciences and life sciences.
4. Identify new pharmacophores.
5. Consider experience based evidence.

**CONCLUSION**

Translational significance is an important aspect of research in any field. It is of greater importance when we find and develop newer drugs for the innumerable diseases and disorders that crop up. The quantum of work on herbs like Tephrosia must be directed in such a way that the research outcomes are easily made available for clinical use. Researchers who work on modern systems may collaborate with traditional systems, adopting better techniques and methodologies that the collective effort sees success at a faster pace.

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