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## Phyto-chemical studies of methanol extracts of *Tinospora cordifolia* growing with different supporting trees by GC-MS

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**Abstract-** Plants are the basis of life on the planet earth as plants and their products directly or indirectly support the life processes. Specially, wild plants constitute an integral part of customs and cultures of different ethnic communities. Plants are the almost exclusive source of drugs for majority of the world population. The phyto components present in *Tinospora cordifolia*, locally known as Gilloy, is used in the treatment of various ailments in the long-established medicinal system in the state of Jharkhand, India and is also an anti-oxidant and immuno-modulator. In the present investigation *Tinospora cordifolia*, independent climber and climbers on different supporting trees has been identified for phytochemistry by screening and quantitative estimation. In the proposed work three categories of experimental plant has been identified: (i) *Tinospora cordifolia* independent climber, (TC); (ii) Climber on Aam or *Mangifera indica*, TC (A) and (iii) Climber on Neem or *Azadirachta indica*, TC (N). Present study was carried out to investigate the phytoconstituents of the *Tinospora cordifolia* which contain terpenoids, steroids, glycosides, flavonoids and Phlobatannins etc. are confirmed by preliminary Phyto-chemical studies. GC-MS analysis of methanol extract of the plant showed the presence of a variety of bioactive compounds. Some of them are of great interest as they are either anti-cancer or anti-oxidant or both

**Key words:** *Tinospora cordifolia*, Phyto-constituent, GC-MS analysis, Anti-cancer, Bioactive compounds.

### INTRODUCTION

*Tinospora cordifolia* belongs to family Menispermaceae is a large deciduous climbing shrub found throughout tropical Indian subcontinent. It consists of about 70 genera and 450 species. This plant is known for its variety of uses in Ayurveda. Some of the active components present in the plant are alkaloids, steroids, diterpenoid lactones, aliphatics and glycosides.<sup>1</sup> This plant is of great interest to researchers across the globe because of its wide-ranging medicinal properties like anti-diabetic, anti-periodic, anti-spasmodic, anti-inflammatory, anti-arthritis, anti-oxidant, anti-allergic, anti-stress, anti-leprotic, anti-

malarial, hepatoprotective, immunomodulatory and anti-neoplastic activities.<sup>3-4</sup> Therefore, the plant *T. cordifolia* can be chosen as a source for the development of industrial products for treatment of various diseases.<sup>5</sup> In the present study *Tinospora cordifolia* is subjected to phytochemical screening and GC-MS analysis in order to screen and confirm the presence of various pharmaceuticals compounds.

### MATERIALS & METHODS

**Collection of samples:** Plant material *Tinospora cordifolia* (independent climber) and climbers on Aam and Neem trees was collected from the campus of Arogya Bhawan, Ranchi. Jharkhand, India.

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OL, (3.BETA.)- and 1-Heptacosanol were present in TCE (A) and TCE (N) and anticancer in nature. Oleic Acid and Calcitriol was found to be present in TCE (A) and TCE (N) and absent in *T. cordifolia* extract (independent climber). Tetradecanoic acid or Myristic acid was antioxidant and anticancer and Pentadecanoic acid was found to be antioxidant in nature. These two bioactive compounds were present only in TCE (A) and TCE (N). However, there were some compounds which were present only in TCE and anticancer in nature such as pentanoic acid, propyl ester or valproic acid, phytol or 2-hexadecen-1-ol and 9,12-octadecadienoic acid (Z, Z)-. Other antioxidant compounds found were benzenepropanoic acid, 2,5-dimethoxy-, hexadecanoic acid, methyl Ester,

pentadecanoic acid, octadecanoic acid, n-hexadecanoic acid or palmitic acid (Table 2). Among all these anticancer compounds, n-hexadecanoic acid or palmitic acid was having highest per cent area (23.12%) in the extract of *Tinospora cordifolia* normal or independent climber as compared to TCE (A) and TCE (N) in which area per cent were 9.67% and 7.15% respectively.

In our investigation, GC-MS analysis of methanolic extract of the stem of experimental plant showed presence of bioactive compounds which are of pharmacological importances. There are 16-17 compounds showing antioxidant and/or anticancer activity of the experimental plant (Table 2).

**Table 2- Anticancer and antioxidant compounds obtained from GC-MS analysis of *Tinospora cordifolia*, TCE, TCE (A) and TCE (N)**

Name of compound	Common name	Chemical formula	Mol. wt.	TCE (A)	TCE (N)	TCE	Activity
Pentanoic acid, Propyl ester	Valproic acid	C <sub>8</sub> H <sub>16</sub> O <sub>2</sub>	144	-	-	+	Anticancer <sup>16</sup>
Calcitriol		C <sub>27</sub> H <sub>44</sub> O <sub>3</sub>	416	+	+	-	Anti-proliferative, Pro-apoptotic, Anticarcinogenic and tumor inhibitory <sup>17</sup>
n-Hexadecanoic acid	Palmitic acid	C <sub>16</sub> H <sub>32</sub> O <sub>2</sub>	256	+	+	+	Antioxidant and anticancer <sup>18</sup>
Heptadecanoic acid	Margaric acid	C <sub>17</sub> H <sub>34</sub> O <sub>2</sub>	270	+	+	+	Anticancer <sup>19</sup>
Stigmasterol		C <sub>29</sub> H <sub>48</sub> O	412	+	+	+	Anticancer inhibit tumor promotion <sup>20</sup>
STIGMAST-5-EN-3-OL, (3. BETA)	Beta sitosterol	C <sub>29</sub> H <sub>50</sub> O	414	+	+	+	Anticancer and antioxidant <sup>15</sup>
1-Heptacosanol		C <sub>27</sub> H <sub>56</sub> O	396	+	+	+	Anticancer and antioxidant <sup>20</sup>
Oleic acid		C <sub>18</sub> H <sub>34</sub> O <sub>2</sub>	282	+	+	-	Cancer preventive <sup>19</sup>
Octadecanoic acid	Stearic acid	C <sub>18</sub> H <sub>36</sub> O <sub>2</sub>	284	+	+	+	Antioxidant and cancer preventive <sup>21</sup>
Benzene propanoic acid, 2,5-dimethoxy-		C <sub>11</sub> H <sub>14</sub> O <sub>4</sub>	210	+	-	-	Antioxidant <sup>20</sup>
Phytol	2-Hexadecen-1-ol	C <sub>20</sub> H <sub>40</sub> O <sub>6</sub>	296	-	-	+	Anticancer <sup>20</sup>
9,12-Octadecadienoic acid (Z,Z)-				-	-		Cancer preventive <sup>19</sup>
Hexadecanoic acid, methyl ester	Palmitic acid methyl ester	C <sub>17</sub> H <sub>34</sub> O <sub>2</sub>	270	+	+	+	Antioxidant <sup>19</sup>
Tetradecanoic acid	Myristic acid	C <sub>14</sub> H <sub>28</sub> O <sub>2</sub>	228	+	-	-	Antioxidant and cancer preventive <sup>19</sup>
Pentadecanoic acid		C <sub>15</sub> H <sub>30</sub> O <sub>2</sub>	242	+	-	-	Antioxidant <sup>18</sup>
Icosanoic acid						+	Antitumor <sup>18</sup>
Cholest-4-en-3-one	Cholesterol			+	+	+	Antioxidant <sup>21</sup>

TCE : Extract of *Tinospora cordifolia* independent climber,

TCE (A) : Extract of *Tinospora cordifolia* climbing on Aam (*Mangifera indica*),

TCE (N) : Extract of *Tinospora cordifolia* climbing on Neem (*Azadirachta indica*)

## SUMMARY & CONCLUSION

Knowledge of chemical constituents of a plant is important and desirable because such information will be important for synthesis of chemical substances. It could be well qualified for application in pharmaceutical industry. The GC-MS analysis of methanolic extract of experimental

plant showed the presence of pharmacologically active compounds such as antioxidant and anticancerous. Phytochemical screening showed the presence of Alkaloids, Flavonoids, Phlobatannins, Saponins, Steroids and Tannins. A comparative analysis of phyto-chemicals and GC-MS of *Tinospora cordifolia* which grows independently and

growing on two different supporting trees *Azadirachta indica* and *Mangifera indica*, established the superiority of the one which grows independently. However, both the antioxidant potential and alkaloid content was higher in TCE (N). Presence of different phytochemicals in the experimental plant suggests its profuse therapeutic efficacy. Quality of this plant can be improved through secondary metabolites production and thus it can be used as a source for developing new drugs and commercialization. Further investigations on preclinical and clinical trials of these extracts could become a part of standard drug designing and treatment protocols for cancer and hence a promising and powerful weapon for cancer treatment.

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