INTRODUCTION

Young branch of *Triticum aestivum* Linn (Hindi name – gehun, kanak), Sanskrit name *godhuma*) is termed as wheatgrass, belonging to the family (Gramineae) [1]. *Triticum* is the genus of yearly and periodic aging, atherosclerosis, ischemic injury, and inflammation. Neurodegenerative diseases (Parkinson’s and Alzheimer’s) [10] cancer, due to oxidative stress and cellular damage it leads to between reactive oxygen and antioxidants. Antioxidants are compounds that protect the cells against the destructive effects of reactive oxygen species such as singlet oxygen, superoxide, Peroxyl radicals, hydroxyl radicals, and Peroxyl nitrate. Cellular damage which is caused by the oxidative stress it is a consequence of inequity between reactive oxygen and antioxidants.

Due to oxidative stress and cellular damage it leads to neurodegenerative diseases (Parkinson’s and Alzheimer’s) [10] cancer, aging, atherosclerosis, ischemic injury, and inflammation.

**Antioxidant activity**

Antioxidants are used to inhibit, delay or prevent the oxidation of oxidizable materials by scavenging free radicals and diminishing oxidative stress [11,12]. Natural antioxidants have been studied widely for compounds protecting against several diseases interrelated to oxidative stress and free radical-induced damage. Till date, numerous plants have been reported antioxidant properties. In the current study, *Triticum aestivum* was assessed for the antioxidant property based on the reputation in folklore medical practice [13-15].

METHODS

**Plant collection and identification**

Wheatgrass (*T. aestivum*) was cultivated and collected from the medicinal garden of Department of Pharmacognosy and Phytochemistry, GIE School of Pharmacy, during the month of June–July 2017 and identified by the botanist from Regional Forest Research Center Rajahmundry, East Godavari District, A.P.

**Preparation of the extract**

The collected wheatgrass was washed with water and dried in shade for about 7 days and powdered in a small-scale blender. About 500g of the powdered wheatgrass was subjected for Soxhlet extraction using different solvents such as petroleum ether, chloroform, ethanol, and water. Solvents selection was based on highly polar in nature. Continuous Sox halation was done for around 12 h for each solvent. The extracts obtained were evaporated at 50–60°C using a hot plate. The residues were stored in airtight containers for further research.

**Preliminary phytochemical screening**

Preliminary phytochemical screening of the extracts was carried out, and it shows the presence of following components in Table 1.

**Antioxidant activity**

1,1- diphenyl, 2 Picrylhydrazyl (DPPH) free radical scavenging assay method was used for the assessment of *in vitro* antioxidant activity for the plant extracts (petroleum ether, chloroform, ethanol, and water) *T. aestivum*.
DPPH radical scavenging activity [17,19]

T. aestivum (wheatgrass) antioxidant properties were determined by DPPH free radical scavenging activity. Various extracts of T. aestivum were taken for preparing different concentrations in distilled ethanol. 1ml of each solution was placed in different test tubes, then added 4 ml of a 0.1 m ethanol solution, shaken vigorously. The tubes were incubated in a dark room at the RT baseline correction. Changes (decrease in absorbance) at 517 nm were measured, and percentage quenching of DPPH was calculated using the formula:

Radical scavenging activity % = \[\frac{(A_0 - A_f)}{A_0}\] \times 100

In vitro wound healing activity [18]

CAM

For in vitro wound healing [16] activity CAM model was used in the present study. In this technique, 9 days old embryonated chicken eggs were selected, and a small 1 cm² incision was made in the shell. Through this methyl cellulose loaded with different herbal extracts of ethanol concentrations of 25 µg, 50 µg, 100 µg, and 125 µg was placed at the connection of the two large vessels on CAM. Tape was used to seal the incision, and then eggs are incubated for 72 h in a well-humidified chamber at 37°C. Then, tape was removed carefully for the observation of a new blood vessel. CAM treated with herbal extracts is compared with CAM containing disc without herbal extract (Control and Standard).

RESULTS

Antioxidant activity

Different extracts such as petroleum ether, chloroform, and ethanol and aqueous extracts of T. aestivum have proved that high antioxidant activity when compared to the reference standard. IC₅₀ values of the standard were found to be 25 and for ethanol extract shows high compared to standard. DPPH activity of petroleum ether extracts of T. aestivum is presented in Table 2 and Fig. 5.

An odd electron is present in DPPH radical is responsible for the absorbance at 517 nm, and it shows visible deep purple color when DPPH accepts an electron donation by an antioxidant compound the DPPH is decolorized, which can be quantitatively measured from the changes in the absorbance. DPPH activity of chloroform extracts of T. aestivum is presented in Table 3 and Fig. 4.

Wound healing activity

The methanolic extract of T. aestivum has a definite pro-healing activity than the normal healing observed by control. Fig. 1 shows methyl cellulose disc without herbal extract and Fig. 2 shows methyl cellulose disc impregnated with methanolic extract of T. aestivum.

DISCUSSION

The phytochemical studies reveal the presence of carbohydrates, amino acids, alkaloids, proteins, saponins, and flavonoids. DPPH activity of different extracts of T. aestivum exhibited high antioxidant as compared to that of the standard. Based on the results of the present study, it indicates that T. aestivum having a pro-healing action than that normal healing observed by significant control. Ether, chloroform, and ethanol extracts of leaf exhibits potential antioxidant activity and wound healing activity in a dose-dependent manner.

CONCLUSION

Determination of natural antioxidant compounds from plant extracts will help to develop new drug candidates for antioxidant therapy. The plants are the best sources for obtaining natural antioxidant compounds for various medicinal uses. The present study explores the antioxidant principles from natural resources. CAM assay is a valuable alternative to the rodent in vivo models for wound healing and even for the study of angiogenesis. CAM in vitro methods are of low cost, short experimental duration easy dynamic observation with minor ethical concerns, and it also has the great accessibility, and easy handling for both intervention and imaging of the vasculature have attracted current researchers. Further

### Table 1: Preliminary phytochemical analysis

| S. No | Name of the Test          | Results |
|-------|---------------------------|---------|
| 1.    | Test for Carbohydrates    |         |
| a.    | Molisch test              |         |
| b.    | Fehling's test            |         |
| c.    | Benedict's test           |         |
| 2.    | Test For proteins         |         |
| a.    | Biuret test               |         |
| b.    | Xanthoprotein test        |         |
| c.    | Millions test             |         |
| 3.    | Test for Amino acids      |         |
| a.    | Ninhydrin test            |         |
| 4.    | Test for Alkaloids        |         |
| a.    | Dragendorff's test        |         |
| b.    | Mayer’s test              |         |
| c.    | Hager’s test              |         |
| d.    | Wagner’s test             |         |
| 5.    | Test for Steroids         |         |
| a.    | Salkowski test            |         |
| b.    | Liebermann reaction       |         |
| 6.    | Test for Phenols and Tannins |     |
| a.    | Ferric chloride test      |         |
| b.    | Lead acetate test         |         |
| c.    | Dilute Nitric acid test   |         |
| 7.    | Tests for fixed oils and fats |   |
| a.    | Saponification test       |         |
| b.    | Stain test                |         |
| 8.    | Test for Glycosides       |         |
| a.    | Keller–Kiliani test       |         |
| 9.    | Test for Saponins         |         |
| a.    | Hemolytic test            |         |
| b.    | Foam test                 |         |
| 10.   | Test for Flavonoids       |         |

+, Presence; -, Absence

### Table 2: DPPH radical scavenging activity of petroleum ether extract of T. aestivum

| Concentration (µl) | OD 517 nm | % Antioxidant activity |
|-------------------|-----------|------------------------|
| Sample            | Standard (µl) | Sample | Standard |
| 50                | 1.212 | 2 | 1.012 | * | 33.94* |
| 100               | 1.132 | 4 | 0.980 | 26.1* | 36.03* |
| 150               | 1.112 | 6 | 0.93 | 27.41* | 41.25* |
| 200               | 1.002 | 8 | 0.851 | 34.59* | 44.45* |

DPPH: 2,2-Diphenyl-1-picryl hydrazyl, Petroleum ether extract values.

T. aestivum: Triticum aestivum

### Table 3: DPPH radical scavenging activity of chloroform extract of T. aestivum

| Concentration (µl) | OD 517 nm | % Antioxidant activity |
|-------------------|-----------|------------------------|
| Sample            | Standard (µl) | Sample | Standard |
| 50                | 1.212 | 2 | 1.012 | 21.19* | 34.22* |
| 100               | 1.128 | 4 | 0.980 | 26.65* | 36.28* |
| 150               | 0.110 | 6 | 0.906 | 27.82* | 41.09* |
| 200               | 0.008 | 8 | 0.851 | 34.06* | 44.66* |

DPPH: 2,2-Diphenyl-1-picryl hydrazyl, Chloroform extract values.

T. aestivum: Triticum aestivum
evaluation of \( T. \) aestivum has to be done in treatment and management of wounds.

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**Table 4: DPPH Radical scavenging activity of Ethanol extract of \( T. \) aestivum**

| Concentration (µl) | OD 517 nm | % Antioxidant activity |
|-------------------|-----------|------------------------|
| Sample Standard (µl) | Sample Standard | Sample Standard |
| 50 | 1.112 | 2 | 1.08 | 23.2* | 25.4* |
| 100 | 1.028 | 4 | 0.864 | 29* | 40.33* |
| 150 | 0.812 | 6 | 0.522 | 43.92* | 63.95** |
| 200 | 0.546 | 8 | 0.362 | 62.29** | 75*** |

DPPH: 2,2-Diphenyl-1-picrylhydrazyl, Ethanol extract values.

\( T. \) aestivum: Triticum aestivum

**Table 5: DPPH Radical scavenging activity of Aqueous extract of \( T. \) aestivum**

| Concentration (µl) | OD 517 nm | % Antioxidant activity |
|-------------------|-----------|------------------------|
| Sample Standard (µl) | Sample Standard | Sample Standard |
| 50 | 1.312 | 2 | 1.110 | 21.49* | 23.02* |
| 100 | 1.042 | 4 | 0.874 | 27.73* | 39.38* |
| 150 | 0.830 | 6 | 0.532 | 42.44* | 63.1** |
| 200 | 0.561 | 8 | 0.382 | 61.09** | 73.5** |

DPPH: 2,2-Diphenyl-1-picrylhydrazyl, Aqueous extract values.

\( T. \) aestivum: Triticum aestivum

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**Fig. 1:** Chorioallantoic membrane without herbal extract

**Fig. 2:** Chorioallantoic membrane with herbal extract

**Fig. 3:** 1,1- diphenyl, 2 Picrylhydrazyl activity of \( T. \) aestivum with ethanol extract

**Fig. 4:** 1,1- diphenyl, 2 Picrylhydrazyl activity of \( T. \) aestivum with chloroform extract

**Fig. 5:** 1,1- diphenyl, 2 Picrylhydrazyl activity of \( T. \) aestivum with petroleum ether extract

**Fig. 6:** 1,1- diphenyl, 2 Picrylhydrazyl activity of \( T. \) aestivum with aqueous extract
AUTHOR’S CONTRIBUTION
Mrs. V. Alekhya and Mr. T. Deepan have done the studies and drafted the article. Dr. M. D. Dhana Raju reviewed the article.

CONFLICTS OF INTEREST
All authors declare that they have no conflicts of interest.

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