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The antimicrobial potency assessment of different extracts of wheat grass (*Triticum aestivum*)

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Abstract

Interest in plant products is growing constantly in the pursuit of novel therapeutics and therapies for the treatment of disease. Microbial resistance makes finding new antibiotic alternatives an essential topic of research. Wheatgrass is one example of a plant product that is being studied pharmacologically (Triticum aestivum L). Wheat grass, one of the members of Poaceae family, has been considered for very efficient therapeutic drugs. It contains numerous nutrients, vitamins, minerals, iron, zinc, sodium, aluminium, calcium, magnesium, amino acids, and a significant amount of chlorophyll. These bioactive substances contribute to enhanced blood sugar control, increased haemoglobin production, and the removal of toxins from the body. There are many bioactive phytochemicals that have therapeutic potential, such as anti-thlassemia, anti-cancer, anti-ulcer, antioxidant, anti-arthritic, and anti-inflammatory properties. Wheat grass is also effective in treating a number of common health issues, including circulatory, skin, and dental issues. Current study was aimed at evaluation of antimicrobial properties of wheat grass extracts of different solvents (chloroform, methanol, and water extract) at various concentration. The extracts were assayed for antimicrobial activity using diffusion test and calculating zone of inhibition for each drug. All these extracts showed antibacterial activity against different microorganisms but Methanolic extracts have shown the maximum antimicrobial activity against *Escherichia coli* and *Pseudomonas aeruginosa.*

Keywords: Wheat grass, *E coli*, anti-bacterial activity.

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Introduction:

It has long been thought that plants might have therapeutic effects. Since prehistory, people have used plants for their therapeutic powers on every continent. The data indicates that 60,000 years ago, Iraqi people used herbs like hollyhock, which are still widely used in ethnomedicine today (Thomson, 1978). After the "golden era" revolution in the 1960s, when nearly all major antibiotic groups (tetracyclines, cephalosporins, aminoglycosides, and macrolides) were dentified and the major chemotherapy issues were solved, history is repeating itself today, and these intriguing compounds are at risk of losing their efficacy due to the rise in microbial resistance (Mayers et al., 2009). Currently, it has a substantial impact on treatment failures caused by germs that are resistant to many drugs, and it has become a worldwide public health issue (Guschin et al., 2015; Martin et al., 2015). Therefore, finding new antibiotics is a particularly essential objective. The majority of the antibacterial chemicals found so far are made of microbial and plant components (Berdy and Antibiot, 2005). Since ancient times, plants have been regarded as a source of therapeutic medicines, and many brand-new medication ingredients have been extracted from their natural plant origins. According to WHO, the greatest source to get different medications is from medicinal plants. Plant-based medications have significantly improved human health (El-Astal et al., 2005). This is due to the old medical systems' significant healing capacity (Adebolu et al., 2005).

The use of herbal or "alternative" medicine is growing in acceptance, and scientific study on wheatgrass as a "functional food" is becoming more widely available and well-liked. Triticum aestivum L, sometimes known as wheat grass, has a long history and is frequently used as a dietary supplement. It has been discovered to be utilised as a dietary supplement for prevention as well as a treatment for serious life-threatening conditions and moderate illnesses. When Ann Wigmore published "The Wheat grass Book" in the 1970s, the consumption of wheat grass, and especially its fresh juice, experienced a resurgence. Although the book itself pays homage to the uses of wheat grass, it makes no mention of whether the applications picked provide reliable scientific evidence or not. The treatment of active distal ulcerative colitis and the impact of wheat grass on its activity when taken as a dietary supplement are discussed in a study contained in Steve Meyerowitz's 1983 book "Wheat grass Natures finest medicine" [Meyerowitz S, 1992]. Numerous minerals, including calcium, phosphorus, magnesium, alkaline earth metals, potassium, zinc, boron, and molybdenum, are present in it. The indole components choline and laetrile (amygdalin), as well as other chemicals, are what give this grass its therapeutic benefits [Padalia S et al., 2010]. Additionally, glycoside compounds, which are similarly effective antioxidants, have been discovered to have the ability to reduce DNA oxidative damage in vitro [Falsioni G et al., 2002]. Additionally, it has been demonstrated that the therapeutic benefits of wheat grass might vary depending on the growth environment [Kulkarni SD et al., 2006]. Although crude phyto-drugs may be less effective than contemporary medications, their negative effects may not be as severe. Therefore, there is a growing need for effective, affordable, safer, and therapeutic agents with minimal to no side effects [Ashok SA, 2011]. When testing wheatgrass extracts against Gram-positive bacteria such Staphylococcus aureus, Bacillus subtilis, and Gram-negative Escherichia coli in 2011, Pallavi et al. used amoxicillin as the gold standard. In comparison to Staphylococcus aureus and Escherichia coli, certain extracts showed significant action against Bacillus subtilis and moderate activity [Pallavi K et al., 2011]. Ashok (2011) also observed antibacterial efficacy against Saphylococcus aureus,

Pseudomonas aeruginosa, and Escherichia coli. There have also been reports of antifungal action against Candida albicans [Ashok SA, 2011]. According to Das A et al. (2012), wheatgrass extracts in 80% acetone were efficient against five food-borne microbes, including the fungus Aspergillus niger, a frequent food contamination. Hence In present study we are exploring photochemistry and antimicrobial properties of wheat grass extract.

Methodology:

Sample preparation: Lokwan wheat variety was shown in different pots, after ninth day grass were harvested and chopped with the help of knife. The collected wheat grass were dried in shade and then powdered with a help of grinder. Wheatgrass powder was subjected to defatting with n-Hexane and then successive soxhlet extraction were carried out by using various solvents(chloroform, methanol, water).The drugs from the different solvent system weighed using a digital weighing balance.

Figure 1: Wheatgrass grown in Pots for the present study.

Antimicrobial activity: The Methanol, chloroform, and water drug extracts of wheat grass were subjected to test antimicrobial activity of the extracts. The extracts were dissolved in 7% of dimethyl sulfoxide (DMSO) and prepared different concentration of the each drug extract for the further experiments. Spread plate technique was used to seed 0.2 ml of a bacterial strains onto petri-plates containing nutrient agar media. A sterile cork borer was used to create wells in the agar medium, and 100 µl of the DMSO-suspended wheat grass extract was then poured to the wells. Additionally, DMSO-only control wells were kept in place. For 24 hours, plates were incubated at 37 °C. By watching the zone of inhibition that forms around each well, activity was identified.

Results and discussion

Earlier studies have validated the antibacterial potency of the phyto-constituents of different variety of wheat grass. [Ashok SA, 2011, Das A et al., 2012, Pallavi K et al., 2011], same pattern was

observed in present study in which the crude drug extract of Lokwan variety of wheat grass (T. aestivum) against gram negative bacterial strains.

Table 1: Anti-bacterial assessment of crude extracts of *T. aestivumon* gram negative bacteria bacterial strains.

Bacteria	Drug conc.				
	Drug	**25 mg/100µL**	**50 mg/100µL**	**75 mg/100µL**	**100 mg/1**
Pseudomonas aeruginosa	methanol extract	2.5 mm	5.1 mm	6.2 mm	8.4 mm
Escherichia coli	methanol extract	5.2 mm	7.3 mm	9 mm	11.3 mm

Four different extracts of wheat grass were prepared namely petroleum ether extract, chloroform extract, methanol extract, and water extract. The extracts were tested for antimicrobial potency against different bacterial species at different concentration (25 mg/100µL, 50 mg/100µL, 75 mg/100µL and 100 mg/100µL) with negative control (Only 5% DMSO).

The significant inhibition was observed for the methanolic extract against *Escherichia coli ;* The zone of inhibition increases with the increase in concentration. *Pseudomonas aeruginosa* also showed an zone of inhibition.

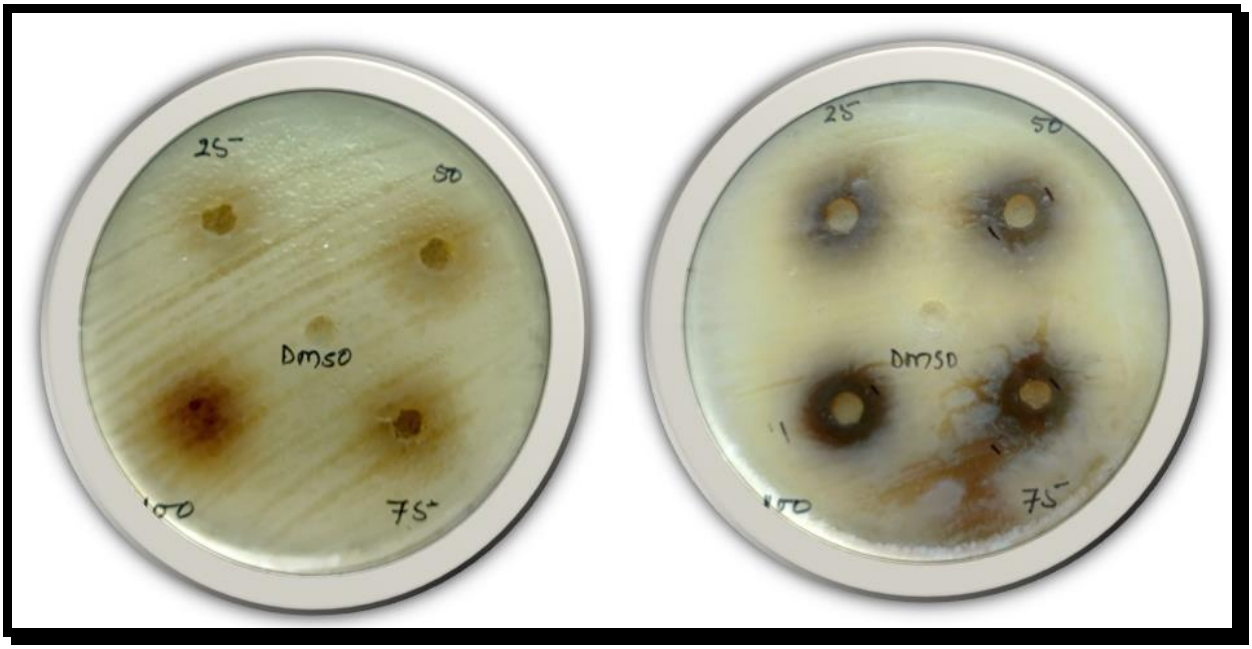

Figure 1: Anti-bacterial assessment of crude extracts of *T. aestivumon on* bacterial strains : Pseudomonas aeruginosa (A) and Escherichia coli (B)

Same pattern of antimicrobial effect were reported from researchers [Rana S et al., 2018, Baral R et al, 2021., Pallavi K et al., 2011]. The antibacterial properties of phytoconstituents have been highlighted. Wheat grass are high in natural antioxidants and antibacterial agents, according to several studies. Thus, it is evident that the bacterial strains show maximum zone of inhibition at higher concentration depicting that wheatgrass is a potent antimicrobial agent.

Conclusion: In present study we have assessed the antimicrobial activity of different extracts of wheat grass, among them *T. aestivum*s showed the promising anti-bacterial activity on gram negative bacterial species.

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