Available online on 15.11.2022 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research

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Review Article

In Vivo and In Vitro Animal Models for Ulcer: A Conscious Review

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Article Info:

Article History:

Received 26 Aug 2022
Reviewed 03 Oct 2022
Accepted 24 Oct 2022
Published 15 Nov 2022

Cite this article as:

Khan MS, Arora P, Kalra N, Arora N, *In Vivo* and *In Vitro* Animal Models for Ulcer: A Conscious Review , Journal of Drug Delivery and Therapeutics. 2022; 12(6):227-231

DOI: http://dx.doi.org/10.22270/jddt.v12i6.5690

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Abstract

An ulcer is definite as a disease that happens owing to subside of the epithelial mucosal wall of the stomach when unguarded to an additional of hydrochloric acid and pepsin enzyme. Research for a potential anti-ulcer agent involves appropriate in vitro or in vivo models. Due to their anatomical, physiological, and genetic similarities to humans, rodents like mice and rats are ideal among the various animal models. In vivo methods are usually applied, as the sickly condition in human being can be imitated with distinct animal prototypes. The in vitro methods have been not often used for investigation of anti-ulcer agents.

Keywords: Ulcer, Hydrochloric Acid, Anti-ulcer agents, Pepsin Enzyme

INTRODUCTION:

An ulcer is mainly caused due to an imbalance between the acid and pepsin and/or due to the weakness of the mucosal barrier [1]. Identification and diagnosis are always of primary importance for any disease. For this reason, researchers or epidemiologists may search for miser clue. Clinical investigations seem to improve with questionnaires designed to identify successfully used methods [2]. However, the demography of results related to ulcers is not stable and changes from time-to-time mainly due to age differences, sex, site of the gastric lesion, blood groups, depression, and social engagement [2–4]. Even though many discoveries were made, these discoveries do have some demerits in them. With time, research findings of an ailment can become irrelevant due to ever-changing pathology. Clinical manifestations of a disease may also differ from a different population [2]. Factors like urbanization, climatic condition, topography, occupational behaviors, psychogenic factors, family genetics, smoking of cigarettes, alcohol consumption, and regular coffee intake contribute to peptic ulcer [2, 5]. Peptic ulcer remains to be the main cause of morbidity and mortality worldwide [6].

Plants have been played an important role in the therapy of human and animal being disease as ancient important therapeutic resources for conventional medicine [1]. Enzymes are made up of proteins that are play important role in catalyzing chemical reactions. Enzymes have been increasing the rate of reactions until they obtain the equilibrium [2-3].

An ulcer is caused due to an imbalance between the gastric acid and pepsin enzyme [4]. The word ulcer is taking from latin word “ulcus” which stand for sore, wound or an ulcer. The erosion generally seen on gastric/duodenal mucosa which is referred as peptic ulcer [5].

Recognition and diagnosis are always of important for any disease. For this purpose, scientists, academician or epidemiologists may search for squirrel clue. Clinical examinations seem to increase with opinion poll designed to identify successfully utilized methods [6].

However, the anthropology of results associated to ulcers is not steady and variations from time-to-time primarily due to age variations, sex, site of the gastric lesion, depression, blood groups, and social engagement [7–9]. Even if many breakthroughs were made, these inventions do have some drawbacks in them. With moment, research conclusions of an infirmity can become immaterial due to ever-altering pathology. Clinical indications of a disease can also vary from a distinct population [10].

Factors like sprawl, climatic condition, geography, working behaviors, psychogenic influences, family inheritances, smoldering of cigarettes, alcohol drinking, and frequent coffee intake give to peptic ulcer Peptic ulcer stays to be the main trigger of morbidity and mortality universal [11].

Various drugs and clinical processes accessible for prophylaxis, alleviation, and medication willbe utilized as long as the assistance overshadows the adverse effects. Polypharmacy is also frequently applied due to the unattainability of a single drug efficient enough to revolutionize gastrointestinal (GI) ulcers. Uncovering greener or developing better drugs could help in avoiding the adverse

effects of being pharmacotherapy for Gastric ulcers. Consequently, finding and confirming the efficacy of new leaders with superior safety and therapeutic possibility involves ethically permitted in-vitro and in-vivo methods.

Various in vivo and in vitro versions are accessible to assess the antiulcer activity of drugs/seeds. Though, variety of a suitable simulation has developed to be complicated as each type has significant benefits as well as shortcomings. Further data about these diverse in vivo and in vitro styles are dispersed in the narrative, literature and tricky to find. The foremost object of this review is too contemporary to the innumerable researchers involved in resonant out revisions on the gastroprotective possible of shrubs or herbal therapies, a comprehensive indication of obtainable in vivo and in vitro mockups that could be castoff for this purpose, along with the fundamental mechanisms of ulcer initiation in apiece method. Thus, it provides a broad interpretation of the matter that will help to take the most applicable standard for the validation of prevailing conventional therapies for gastric ulcers and expansion of novel flower-built drugs that could be utilized for their hindrance and alleviate.

An ulcer is definite as a disease that happens due to the collapse of the epithelial mucosal barricade of the stomach when unprotected to an additional of hydrochloric acid and pepsin enzyme [12-13]. The inequity between mucosal defense and aggressive influences also subsidizeto irregularities of the gastric mucosa [14].

Pre-clinical models for the estimation of anti-ulcer agent

In any drug expansion, a pre-clinical analysis is a stage of investigation that is conducted out prior to clinical trials. The major intention and significance of pre-clinical assessment and/or examination is to accumulate data in assistance of the security of the agent underneath examination.

In-vitro: The purpose of preclinical methods for in vitro assessment of anti-ulcer agent is restricted. Literature data existing expose the usage of Indomethacin as the leading persuader for ulcer. For in vitro method, test medicines are assessed using several biological provisions.

Biological Preparation	Drug	Inducer Technique
Cultures of gastric cells fromrats [15]	Sucralfate formulations, aluminium hydroxide, potassium sucrose octasulfate heptahydrate and 5-aminosalicylic acid	Indomethacin
Gastric mucosal cells of rats[16]	Sucralfate, Rebamipide,Cimetidine	Indomethacin
Human iPS cells [17]	Meloxicam, Indomethacin,Ketoprofen, irsogladine, rebamipide	Indomethacin
Gastric mucosal cells of rats[18]	Rebamipide	Mucin 2 assay
Rabbit gastric mucosal cells[19]	Leminoprazole	Mucin 2 assay
Rat gastric epithelial cells[20]	Rebamipide on paracellular permeability of rat gastricepithelial cells	Indomethacin

***In vivo* model**

In vivo models for estimation of anti-ulcer agents are commonly used. From the various prose surveys, various in vivo animal inducer models have been finding. A sequence of test medicines had been endangered for scientific assessment in different varieties of gnawers like mice, rat and guinea pigs.

Animal	Drug	Inducer
Rat	Garcinia indica	Histamine [21-25]
Rat	Somatostatin	
Guineapig	Brompheniramine	
Guineapig	Cyproheptadine HCl	
Guineapig	Dimaprit	
Rats	Benincasa hispida	
Albino rats	Polyherbal formulation	Indomethacin [26-31]
Albino rats	Avicenna mariana	
Sprague-Dawleyrats	Bauhinia purpurea leaf	
Rats	Garlic	
Rats	Telmisartan	
RatsRats	Rats Melatonin	
Albino rats Sprague-Dawley rats , Mice	Polyherbal formulations Bauhinia purpurea Tetrahydrocoptisine Asparagus pubescens Methylene Blue Garcinia indica Hericium erinaceus Bovine Milk Nobiletin Annona muricataβ-glucan Aucubin	Ethanol [31-41]
RatsRatsRats	Polyherbal formulation Role of Leukocytes Zinc-carnosine chelate	Ischemia1reperfusion [41-43]
RatsRats	Jasminum grandiflorumPolyalthia longifolia	Aspirin [44-45]

RatsRatsRatsRatsRats	Quinoline-chalcone Montelukast cyproheptadineHCl and Promethazine HCl Pantoprazole	Pylorus ligation [46-51]
Rats	Madhuca indica	Naproxen [52]
Mice	Rebamide	Radiation [53]
RatsRatsRats	Turmeric Ginger Omeprazole	H.Pylori [54-57]
Rats	Hesperidin	Acetic acid [58]
Rats	Bee venom	Acetylsalicylic acid [59]
Rats	Polyalthia longifolia	HCL [60]
Rats	HCl	Gastric distension [61]
RatsRatsRatsRatsRatsRatsRats	MontelukastCyclodextrin Nitrous oxide synthase Mild whole-body heating Enhancing nitric oxide synthase Prostaglandin levelBody Temp	Water immersion stress [62-65]
MiceRats Rats Rats	Thenalidine PGE1 Somatostatin Leucas aspera	Serotonin [66-70]
Rats	Rebamipide	Diethyldithiocarbamate [71]
RatsRatsRatsRatsRats	Zinc deficiencyCimetidine Pantoprazole Atropine and AntacidsOmeprazole	Stress Induced [72]
Mice, Rats	5-lipoxygenase inhibitors and leukotrienes antagonist Misoprostol, Omeprazole	NSAIDs [73]
Rats	Hypolaetin-8-glucoside	Carrageenan [74]

DISCUSSION

The in vitro methods have been rarely used for investigation of anti-ulcer agents. In vitro assessment of anti-ulcer drugs is hardly used as adequate results cannot be acquired applying test-tube trials [75]. Moreover, it is not easy to stimulate the outcomes of long duration disclosure [76]. In vivo methods are generally applied, as the sickly condition in human being can be imitated using distinct animal prototypes [76]. Owing to their anatomical, physiological, and genetic similarities to humans, rodents like mice and rats are preferred among the various animal models. Maintenance and handling of rodents are easy due to their convenient smaller size [77]. Interestingly, mice share more than 98% DNA similarities with humans [77].

CONCLUSION

Research for a prospective anti-ulcer agent involves fitting in vitro or in vivo models. The existing verbatim assessments systematically require a anthology of methods that are utilized in estimating anti-ulcer causes. With essential knowledge created easily understandable like ulcer inducer, drug and biological research vise versa animal simulation utilized, investigators of prospective anti-ulcer agents can use this review.

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