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Research Article

IN-VIVO EVALUATION OF BI-LAYERED FLOATING TABLET OF SUCRALFATE AND METOPROLOL SUCCINATE BY RADIOGRAPHIC IMAGING TECHNIQUES

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ABSTRACT

The present study deals with determination of floating characteristics of Sucralfate and Metoprolol Succinate by radiographic imaging techniques as in vivo evaluation method by rabbit as model.The best formulation of Bi layered floating tablet of Sucralfate and Metoprolol succinate is taken. The floating characteristics of Sucralfate and Metoprolol Succinate is determined by In-vivo X-Rays Studies (Radiographic imaging technique) implemented after the ingestion of the tablet. The rabbits were exposed to X-Ray photography and floating efficacy of floating tablet at different time intervals in rabbit's stomach are show in the stomach region at 40mA, 45KV, and 5mAs at different time intervals for 0, 1, 2, 4, 6 hours. The distance between the source of X- ray and rabbit abdomen was kept constant (80 cm) for all images After 2 h and 4 h administration of floating tablet showed that floating tablet was still found to be buoyant on gastric content, respectively. at 6h after administration of floating tablet showed that floating tablet at lower gastric region displayed still buoyant position..The formulation showed better floating capacity confirming potential of floating-drug delivery system for prolonging gastric residence and enhancing local effect.

INTRODUCTION

Radiography is a diagnostic *(Press release N C R P & M,. March 5, 2009)* imaging technique that uses ionizing radiation (x-rays) to produce an image of an internal body structure. Wilhelm Conrad Roentgen discovered x-rays in the year 1895. Since then the technology has evolved rapidly. Initially, radiographs were produced by exposing silver-containing films to ionizing radiation. Within the last decade, film-based radiography has transitioned in human as well as veterinary medicine to digital radiographic images. Today, virtually all types of medical images can be produced and stored in digital format. Radiography is used to diagnose disease of the chest, abdomen and musculoskeletal system. Additionally, contrast imaging studies are performed to evaluate the gastrointestinal and urinary tract.

The term in vivo refers (*Eldrige BL,2019)* to a medical test, experiment or procedure that is done on (or in) a living organism, such as a laboratory animal or human. Clinical trials or medical studies may be performed either in vivo or in vitro. These approaches are similar in that they are both done in order to make advances in our knowledge and treatment of illness and disease as well as understanding "wellness" and normal bodily functions.

Laboratory animal models serve as a facilitator to investigate (Pasupuleti MK *et al,* 2016) etiopathogenesis of periodontal disease, are used to know the efficacy of reconstructive and regenerative procedures, and are also helpful in evaluation of newer therapeutic techniques including laser and implant therapies prior to application in the human beings.

The Indian National Science Academy developed the updated guidelines to use of animals in scientific research(.Olfert ED *et al* ,1993),(Sahni SK *et al,*2000),(Sahni SK ,2012)By knowing the guidelines to use of animals in research, it is easy to follow the ethical guidelines.

All the scientists who are working with experimental animal models should follow the ethical guidelines at institutional or national level before starting their research work. Every individual should strictly adhere to the animal ethics committee. Russell (WM *et al,* 1959)

This committee should involve in examining the animals, scientists, and the technicians handling the animals before starting the experiment. The following are some of the ethical

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guidelines to be followed for use of animals in dental research (Richmond J ,2008, ILAR J).It is important to know the animal profile prior to the use in research. Animal profile includes physiological norms of commonly used laboratory models such as mouse, rat, hamster, guinea pig, rabbit, cat, dog, and monkey. Age at maturity, adult weight, respiratory rate, rectal temperature, pulse rate per minute, and life span are some of the physiologic norms of the healthy animal models to follow during selection for research. (Bhardwaj KR *et al*,1990)

Sucralfate has the theoretical advantages that it does not favour colonisation of the st omach with colonic flora ; it can be implemented particularly in patients with gastric ulcer and atrophic gastritis. Since maintenance treatment with either Sucralfate or antisecrotory agents reduces the recurrence rate of gastric ulcer. So Sucralfate is considered as clinically relevant. *(-Blum AL et al 1989)* It can be administrated in empty stomach max 1 gm before 1 hr of mill in case of acidity in pregnancy and lactation It provide surface protein at ulcer base and act as physical barrier preventing acid.

Metoprolol succinate *(Feng Z et al ,2011)* is selective β-1 blocker. applicable for mild to moderate essential hypertension,angina pectroris, myocardial infraction. It can provide the sustained action on blood pressure over 24 hours. So it is an effective drug to treat essential hypertension.7It have low risk of adverse effect on uterus.(*Astra Zeneca AB NDA 19-962 /S- 032 :3-17)* The starting dose is 100 mg once a day and maintenance dose 200 mg /day in empty stomach.

Both the drugs Sucralfate and Metoprol succinate can be implemented in combine form in empty stomach in period of pregnancy and lactation and they produce minor drug interaction. *Briggs (GG et al,* 2015) So they can be implemented in pregnant mother as well as lactate mother suffering from pregnancy and lactation.

The present study deals with determination of floating characteristics of Sucralfate and Metoprolol Succinate from the best formulation of Bi layered floating tablet of Sucralfate and Metoprolol succinate by radiographic imaging techniques as in vivo evaluation method by rabbit as model**.** The rabbits were exposed to X-Ray photography and floating efficacy of floating tablet at different time intervals .

METERIALS AND METHODS: (Das SR *et al* 2019)

Selection of best formulation of the best formulation of Bi layer floating tablet the best formulation of Bi layer floating tablet

After various study about Formulation, Development, Evaluation and optimization of Sucralfate and metoprolol Succinate the best formulation of Bi layer floating tablet is selected.

Table 1 In vivo evaluation through X-Ray studies (Radiographic Imaging Technique

Animal care and handling

The experiment was carried out on Healthy white rabbits of 12 months, weighing between 1.5-2.0kg. The animals were acclimatized to the standard laboratory conditions in cross ventilated animal house at temperature 25±2°C relative humidity 44-56% and light and dark cycles of 12:12 hours, fed with standard pellet diet and water ad libitum during experiment. The animal protocol was approved by the institutional ethics committee and as per Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) guidelines.

Procedure (Shirtliff ME et al, 1999), (Sarangapani.S et al, 2014), (Dandag PM et al ,2013)

The rabbit was fasted 24 h prior (overnight fasted) to experiment and allowed free accesses to water only. The floating property of the selected floating tablet was studied by radiographic imaging technique under the guidance of a qualified radiologist.To make the tablet X-Ray opaque,barium sulphate ($BaSO_4$) was incorporated in tablets. Barium sulphate has a high density (4.4777 g/cm^3) and poor floating properties. The tablets prepared for radiographic imaging contained (rabbit dose, 80mg/kg) where a part of the drug was replaced with $BaSO_4$ for in vivo studies. A wooden block with central opening was placed between upper and lower teeth of rabbit and tablet was administered orally using oral gavages by the help of a hollow tube made up of polyethylene. The tube was inserted into the mouth of rabbit and blown using rubber bulb. About 5-10 ml of water was further administered (flushed) to ensure the complete delivery of the dosage form.

X-Ray photographs were also taken for the rabbits before giving the dosage form (pre-treatment) to ensure that no material containing Barium sulphate was present in the stomach and these photographs served as control. After the ingestion of the tablet, the rabbits were exposed to X-Ray photography in the stomach region. X-rays photographs were taken under the guidance of a qualified radiologist at different time intervals for 0, 1, 2, 4, 6 hours.

X-ray imaging was done at 40mA, 45KV, and 5mAs (Genius-60 Mobile portable unit, Wipro GE Medical Systems Ltd., Pune, India). The distance between the source of X- ray and rabbit abdomen was kept constant (80 cm) for all images

RESULT

Taken at 2 h and 4 h after administration of floating tablet showed that floating tablet was still found to be buoyant on gastric content, respectively. at 6h after administration of floating tablet showed that floating tablet at lower gastric region displayed still buoyant position.

The in vivo (X-Ray) evaluation of floating tablets showed that the tablet was floating in the rabbit stomach up to 6 hours.The X-ray photographs of in vivo floating efficacy of floating tablet at different time intervals in rabbit's stomach are shown in Figure12and13. Figure13 shows X-ray before administration (0 hour) of floating tablet. Floating tablet can be seen in the stomach. Next image, Figure 13A, taken at 1 hour shows change in position of floating tablet; this shows that floating tablet did not adhere to gastric mucous. Next image, Figure 13B and 12C, taken at 2 h and 4 h after administration of floating tablet showed that floating tablet was still found to be buoyant on gastric content, respectively. At figure 12D, taken at 6h after administration of floating tablet showed that floating tablet at lower gastric region displayed still buoyant position.

The in vivo (X-Ray) evaluation of floating tablets showed that the tablet was floating in the rabbit stomach up to 6 hours.

Figure 2 X-ray photograph of rabbit after treatment at specified time intervals from abdomen portion (Control

Table 1 Composition of the best formulation of Sucralfate and Metoprolol Succinate

SL No	*Ingredients*	Quantity per Ingredients in mg(Optimized Sucralfate Layer)	*Ingredients*	Quantity per Ingredients in mg (Optimized Metoprolol Succinate Layer)
1	sucralfate	100	*Metoprolol Succinate*	50
2	cross povidone	7	HPMC K 100 M	25
3	aerosil	1	SODIUM BICARBONATE	15
4	lactosemfl	31.25	AEROSIL	3
5	mcc ph101	43.575	EUDRAGIT-RSPO	20
6	sodium bicarbonate	15	EUDRAGIT-RLPO	7.5
7	polysorbate 80	7	EUDRAGIT-RS100	5
8	hpc-l	5	Na CMC	17.5
9	magnesium stearate	3.75	SODIUM ALGINATE	15
10	sunset yellow (0.25%)	0.3125	HPC	12.5
11	purified water	qs	ETHYL CELLULOSE	10
	total weight	214	PVPK -90	2.5
12			TALC	3
13			IPA	Q.S
14			PURIFIED WATER	Q.S
15			TOTAL WEIGHT	186

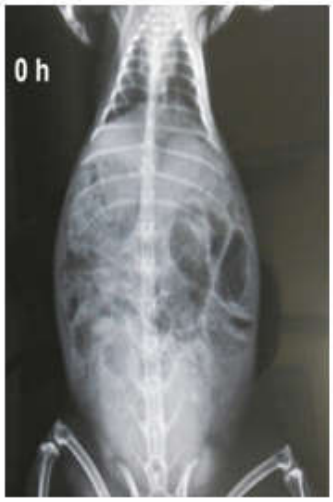

Figure 1 X-ray photograph of rabbit before treatment (0 hour, before tablet administration) from abdomen portion (Control)

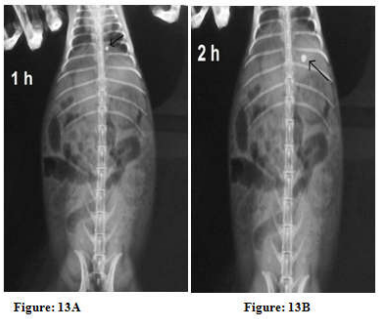

Figure: 13A Figure: 13B

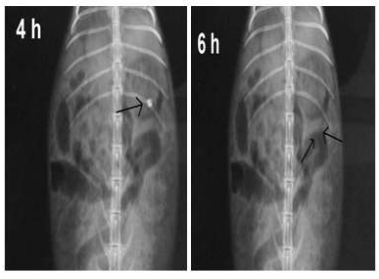

Figure: 13C Figure: 13D

DISCUSSION

Due to the present research it is determined the floating characteristics of Sucralfate and Metoprolol Succinate by radiographic imaging techniques as in vivo evaluation method by rabbit as model of The best formulation of Bi layered floating tablet of Sucralfate and Metoprolol succinate

The presence research proved that at maximum % of Sodium bicarbonate, Magnesium oxide, and Sodium CMC at the Sucralfate layer and In presence of maximum % of Metoloze, Acrilic acid, and Aerosil the formulation produce the resultant ; after 2 h and 4 h administration of floating tablet sh was still found to be buoyant on gastric content, and at 6h after administration of floating tablet showed that floating tablet at lower gastric region displayed still buoyant position..The formulation showed better floating capacity confirming potential of floating-drug delivery system for prolonging gastric residence and enhancing local effect So it is confirmed that the formulation (DSFMS) produce better Bi layered Floating Table **.**

CONCLUSIONS

After 2 h and 4 h administration of floating tablet showed that floating tablet was still found to be buoyant on gastric content, respectively. at 6h after administration of floating tablet showed that floating tablet at lower gastric region displayed still buoyant position.. .It showed efficacy confirming potential of floating-drug delivery system for prolonging gastric residence and enhancing for prolonging gastric residence and enhancing local effect .So the developed formulation of Sucralfate and Metoprolol Succinate (DSFMS) is the best formulation of Bilayered Floating Tablet which can considered as the best formulation of GRDDS and may be proceded for further studies.

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References

'Medical Radiation Exposure Of The U.S. Population Greatly Increased Since The Early 1980s" *(Press release).2019. National Council on Radiation Protection & Measurements.March 5, 2009.* Retrieved May 9, 2019.

Eldrige BL ,2019.In vivo vs in vitro –Defination, Similarities,and differences Updated March 13, 2019. avilable at https://www.verywellhealth.com/what-does-in-vivo-and-in-vitro-2249118

Pasupuleti MK, Molahally SS,Salwaji S.2016, Ethical guidelines, animal profile, various animal models used in periodontal research with alternatives and future perspectives.,20(4):360-368

Olfert ED, Cross BM, McWilliam AA, editors. Guide to the Care and Use of Experimental Animals, 2nd ed. Canada: Wesley Publishing Co; 1993. p. 1-298.

Sahni SK, editor.2000. Guidelines for care and use of animals in scientific research, 1st ed. New Delhi: Bengal Offset Works;. p. 1-31.

Molly Greene, 2012.MS, editor. International guiding principles for biomedical research involving animals. Geneva: CIOMS; 2012.

Russell WM, Bureh RL. The Principles of Humane Experimental Technique. London: Methuen;. Richmond J,2002 Refinement, reduction, and replacement of animal use for regulatory testing: Future improvements and implementation within the regulatory framework. ILAR J 2002;43 Suppl 1:S63-8.

Bhardwaj KR, Rathore DS.,1990.Animal profile. Lucknow: Central Drug Research Institute; .

Blum AL, Bethge H, Bode JC, Domschke W, Feurle G, Heckenberg K ,*et al* .Sucralfate in The Treatment and Prevention of Gastric Ulcer : Multicenter Double blind Plecebo Controlled Study. *Clinical trial* ,Gut .1989 Sept 11 ; 31:825-30.

Feng Z.The anyalysis of 60 Patients of essential Hypertension treatment with Metoprolol succinate Sustained Release Tablet. Heart.2011 October ; 97(3):A 202.

Astra Zeneca AB. Metoprolol succinate Extended Release Tablets .NDA 19-962 /S-

032 :3-17. Avilable at-https://www.accessdata.fda.gov > label.

Drug interaction between Metoprolol succinate ER and sucralfate. Avilable at- https:// www.drugs.com / drug interaction / metoprol Succinate ER with .sucralfate – 1615 – 14142 -2118 o.html ?professional =1

Das SR, Panigrahi BB, Pani MK.,2019. Comparative study of various formulations of bi layered floating tablet of Sucralfate and Metoprolol succinate .Article No IJRSR-13633/2019

Shirtliff ME,1999. Oral Rifampin plus Azithromycin or Clarithromycin to treat Osteomyelitis in rabbits,ClinOrthopRelat,(359):229-236.

Sarangapani.S,2014.In vitro and in vivo evaluation of the gastro retentive floating dosage form Int Res J Pharm,5(9):695-700.

Dandag PM, 2013. Formulation and Evaluation of Itopride Hydrochloride Floating Beads for

Gastroretentive Delivery. Int J Pharm Sci Nanotech,;6(4);2269-2280.

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