



**Preparation, Characterization, and Antifungal activity of Sertaconazole-Sulfobutyl
ether - β -Cyclodextrin Complex**

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Dedication

This thesis is dedicated to my parents, my husband and my lovely family. My parents, the source of my happiness and success in my life, who have always been supportive anytime I needed their support, without them I would have been unable to accomplish this competitive phase of education. To my husband, because of your love, acceptance, patience and encouragement that has been seen through our first year of marriage and my last year of thesis. I will appreciate all you have done for me. To my sisters and my brothers for funny times I spent it with them after feeling tired and frustrated. To my little girl Eleen, my Soul, you are the joy of my life and I love you forever.

I also dedicate this thesis to my friends for happy and hard times we went through together during our Master's journey.

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TABLE OF CONTENTS

_	Content	Page
_	Authorization form	Ii
_	Committee Decision Dedication	Iii
_	Dedication	Iv
_	Acknowledgement Authorization form	V
_	Table of Contents	Vi
_	List of Tables	X
_	List of Figures	Xi
_	List of Abbreviations or symbols	Xiv
_	Abstract (in the language of the thesis)	Xvi
1	Introduction	1
1	Introduction	1
1.1	Research aims and objectives	5
2	Literature review	6
2.1	Background of fungi, fungal infections and antifungal drugs	6
2.2	Description of sertaconazole	8
2.2.1	Therapeutic efficacy of sertaconazole	9
2.2.2	Anti-inflammatory and anti-itch activity of sertaconazole	9
2.2.3	Spectrum activity of sertaconazole	10
2.2.4	Antibacterial activity of sertaconazole <i>in vitro</i>	10
2.3	Background of cyclodextrin	11
2.3.1	Applications of cyclodextrin	13

2.3.2	Formation of inclusion complex of cyclodextrin	14
2.3.3	Sulfobutyl ether- β -cyclodextrin	15
2.4	Previous studies	16
3	Materials and Methods	20
3	Materials, ingredients and equipment	20
3.1	Preparation of sertaconazole/ cyclodextrin complexes	22
3.1.1	Preparation of the physical mixture	22
3.1.2	Co- grinding method	22
3.1.3	Co-evaporation method	23
3.2	Characterization of SER/CD complexes: FT-IR, XRD and DSC.	23
3.2.1	Fourier –Transform infrared spectroscopy (FT-IR)	23
3.2.2	Differential scanning calorimetry (DSC)	24
3.2.3	X-ray diffraction (XRD)	24
3.2.4	<i>In vitro</i> dissolution study	25
3.2.4.1	Acetate buffer preparation	25
3.2.4.2	Calibration curve	25
3.3	Preparation of sertaconazole topical hydrogel and sertaconazole vaginal suppositories	25
3.3.1	Hydrogel formulation	25
3.3.2	Evaluation of sertaconazole hydrogel	26
3.3.2.1	Drug content	26
3.3.2.2	pH	26
3.3.2.3	Viscosity	26

3.3.2.4	Homogeneity and appearance	26
3.3.2.5	<i>In vitro</i> drug release	26
3.3.3	Vaginal suppositories formulation	27
3.3.4	Evaluation of prepared SER vaginal suppositories	28
3.3.4.1	Drug content	28
3.3.4.2	Hardness test	28
3.3.4.3	Melting point determination	29
3.3.4.4	Disintegration time	29
3.3.4.5	<i>In vitro</i> release studies	29
3.4	Evaluation of the antifungal activity of the optimized formulations of SER against <i>Candida albicans</i>	29
3.4.1	Agar well diffusion method	29
3.4.2	<i>Ex vivo</i> pig skin culture method	30
3.4.3	Statistical analysis	31
4	Results and Discussion	32
4.1.1	Differential scanning calorimetry	32
4.1.2	X- ray diffraction studies	37
4.1.3	Fourier –Transform infrared spectroscopy	43
4.1.4	<i>In vitro</i> dissolution studies	53
4.2.	Evaluation of SER hydrogels	58
4.2.1	Drug content	58
4.2.2	Ph	58
4.2.3	Viscosity	58

4.2.4	Homogeneity and appearance	58
4.2.5	<i>In vitro</i> drug release studies	59
4.3.	Evaluation of prepared SER vaginal suppositories	60
4.3.1	Drug content	60
4.3.2	Hardness test	60
4.3.3	Melting point	61
4.3.4	Disintegration time	61
4.3.5	<i>In vitro</i> release studies	61
4.4	Evaluation of the antifungal activity of the optimized formulations of SER against <i>Candida albicans</i>	64
4.4.1	Agar well diffusion method	64
4.4.2	<i>Ex vivo</i> pig skin culture method	65
5	Conclusion	67
5.1	Conclusion and Future recommendations	67
6	References	68
–	References	68
–	Appendix	79
–	Abstract (in the second language)	84

LIST OF TABLES

Number	Table caption	Page
1	Chronological development of cyclodextrin	11
2	List of chemicals	20
3	List of equipment and instruments used	21
4	The composition of the prepared SER vaginal suppositories	28
5	The melting endotherm and heat fusion of prepared systems	36
6	Physical characteristics of prepared SER hydrogels	60
7	Physical characteristics of prepared SER vaginal suppositories	63
8	Average inhibition zone of hydrogel preparations on different yeast (mean \pm SD, n=3).	64
9	The cumulative percentage of SER dissolved at pH 4.5 from the different prepared samples using HP- β -CD at 1:1 molar ratio	79
10	The cumulative percentage of SER dissolved at pH 4.5 from the different prepared samples using HP- β -CD at 1:2 molar ratio	79
11	The cumulative percentage of SER dissolved at pH 4.5 from the different prepared samples using SBE- β -CD at 1:1 molar ratio	80
12	The cumulative percentage of SER dissolved at pH 4.5 from the different prepared samples using SBE- β -CD at 1:2 molar ratio	81
13	Cumulative percentage of SER released from the prepared hydrogels at pH 4.5.	82
14	Cumulative percentage of SER released from different suppository bases at pH 4.5.	83

LIST OF FIGURES

Number	Figure caption	Page
Fig. 1	Chemical Structure of sertaconazole nitrate	2
Fig. 2	Chemical Structure of sulphobutyl ether- β -cyclodextrin	3
Fig. 3	Applications of CDs	14
Fig. 4	DSC thermograms of SER, HP- β -CD and their physical, ground and co-evaporate mixtures at molar ratio of (1:1).	34
Fig. 5	DSC thermograms of SER, HP- β -CD and their physical, ground and co-evaporate mixtures at molar ratio of (1:2)	35
Fig 6	DSC thermograms of SER, SBE- β -CD and their physical, ground and co-evaporate mixtures at molar ratio of (1:1)	35
Fig7	DSC thermograms of SER, SBE- β -CD and their physical, ground and co-evaporate mixtures at molar ratio of (1:2)	36
Fig 8	XRD diffractogram of SER and its co-evaporate, physical and ground mixtures with HP- β -CD at 1:2 molar ratio.	39
Fig 9	XRD diffractogram spectra of SER and its physical, ground and co-evaporate mixtures with SBE- β -CD at (1:2) molar ratio.	40
Fig 10	XRD diffractogram spectra of SER and its co-evaporate mix with SBE- β -CD at (1:2) and (1:1) molar ratios	41
Fig 11	XRD diffractogram of SER and its co-evaporate mix. with SBE- β -CD and HP- β -CD at 1:2 molar ratio.	42
Fig 12	FT-IR spectrum of sertaconazole nitrate	46
Fig 13	FT-IR spectrum of HP- β -CD	46
Fig 14	FT-IR spectrum of SBE- β -CD	47
Fig 15	FT-IR spectrum of SER and its physical mixture with HP- β -CD at 1:1	47

	molar ratio	
Fig 16	FT-IR spectrum of SER and its physical mixture with HP- β -CD at 1:2 molar ratio	48
Fig 17	FT-IR spectrum of SER and its ground mixture with HP- β -CD at 1:1 molar ratio	48
Fig 18	FT-IR spectrum of SER and their ground mixture with HP- β -CD at 1:2 molar ratio	49
Fig 19	FT-IR spectrum of SER and its co-evaporate mixture with HP- β -CD at 1:1 molar ratio	49
Fig 20	FT-IR spectrum of SER and its co-evaporate mixture with HP- β -CD at 1:2 molar ratio FT-IR	50
Fig 21	FT-IR spectrum of SER and its physical mixture with SBE- β -CD at 1:1 molar ratio	50
Fig 22	FT-IR spectrum of SER and its physical mixture with SBE- β -CD at 1:2 molar ratio	51
Fig 23	FT-IR spectrum of SER and its ground mixture with SBE- β -CD at 1:1 molar ratio	51
Fig 24	FT-IR spectrum of SER and its ground mixture with SBE- β -CD at 1:2 molar ratio	52
Fig 25	FT-IR spectrum of SER and its co-evaporate mixture with SBE- β -CD at 1:1 molar ratio	52
Fig 26	FT-IR spectrum of SER and its co-evaporate mixture with SBE- β -CD at 1:2 molar ratio	53
Fig 27	Calibration curve of SER at buffer pH of 4.5 using concentrations ranging from 5-40 μ g/ml (mean \pm SD).	55

Fig 28	SER release profile alone at pH 4.5	55
Fig 29	The cumulative percentage of SER dissolved at pH 4.5 from the different prepared systems using HP- β -CD at 1:1 molar ratio. A: co-evaporate, B physical, C: ground mixtures.	56
Fig 30	The cumulative percentage of SER dissolved at pH 4.5 from the different prepared systems using HP- β -CD at 1:2 molar ratio. A: co-evaporate, B physical, C: ground mixtures.	56
Fig 31	The cumulative percentage of SER dissolved at pH 4.5 from the different prepared systems using SBE- β -CD at 1:1 molar ratio. A: co-evaporate, B physical, C: ground mixtures.	57
Fig 32	The cumulative percentage of SER dissolved at pH 4.5 from the different prepared systems using SBE- β -CD at 1:2 molar ratio. A: co-evaporate, B physical, C: ground mixtures.	57
Fig 33	Cumulative percentage of SER released from the prepared hydrogels. A: carbopol, B: HPMC and C: Na CMC.	59
Fig 34	Cumulative percentage of SER released from fatty suppository bases. A: WitepsolH-15, B: Suppocire AML, C: Suppocire BS2X at pH 4.5.	62
Fig35	Cumulative percentage of SER released from PEGS suppository bases. A: (PEG1500: PEG6000 50:50% W/W) and B: (PEG4000: PEG6000 50:50% W/W) at pH 4.5.	63
Fig 36	The effect of hydrogel preparations on <i>Candida albicans</i> cultured on <i>ex vivo</i> porcine skin explants. Results are means of $n=3\pm SD$	66

LIST OF ABBREVIATIONS OR SYMBOLS

Abbreviation or symbols	Definition
SER	Sertaconazole
HP- β -CD	Hydroxy propyl- β -cyclodextrin
SBE- β -CD	Sulfobutyl ether- β -cyclodextrin
CD	Cyclodextrin
DSC	Differential scanning calorimetry
FT-IR	Fourier Transform infrared spectroscopy
XRD	X-ray diffraction
PH	Potency of hydrogen
Cps	Centi poises
DT	Disintegration time
Kg	Kilogram
PEG	Polyethylene glycol
<i>C. albicans</i>	<i>Candida albicans</i>
G	Gram
MI	Milliliter
ATCC	American type culture collection
Na CMC	Sodium carboxymethyl cellulose
HPMC	Hydroxypropyl methyl cellulose
NaOH	Sodium hydroxide
SD	Standard deviation
Min	Minute
T	Time
CFU	Colony Forming Unit

Hr	Hour
UV-Vis	UV-Visible spectroscopy
DV	Displacement value
RPM	Revolution per minute
Mix	Mixture
M wt	Molecular weight
H.V.S	High vaginal swab
MR	Melting range
β -CD	Beta cyclodextrin

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ABSTRACT

Background: Vaginal candidiasis is one of the most common infections in women. A large variety of antifungal drugs are used for treatment. Sertaconazole (SER) is an imidazole derivative used for treatment of local and systemic fungal infections. Sertaconazole has poor water solubility which affects its dissolution and bioavailability. The objective of this study was to enhance the dissolution and therapeutic efficacy of SER through interaction with certain cyclodextrins (CD) namely HP- β -CD and SBE- β -CD. This could also improve the overall drug efficiency toward *C. albicans*. In addition, the optimum system in terms of higher *in vitro* release was formulated into vaginal suppositories and topical hydrogels for maximum effect.

Methods: Inclusion complex of SER and CD either HP- β -CD or SBE-B-CD were prepared by physical mixture, ground mixture and co-evaporated at 1:1 and 1:2 molar ratios. Systems were characterized by Fourier Transform infrared spectroscopy (FT-IR), differential scanning calorimetry (DSC), X-ray diffraction (XRD) and *in vitro* dissolution studies. SER hydrogels were formulated in different gelling agents and evaluated for their pH, viscosity, homogeneity, *in vitro* drug release, drug content and antifungal activities. SER vaginal suppositories were formulated using hydrophilic and hydrophobic bases and evaluated for their hardness, disintegration time, drug content, melting point and *in vitro* drug release.

Results: Results obtained from FT-IR, DSC, XRD and *in vitro* dissolution studies showed that the co-evaporation method was the best method for forming the inclusion complex with the investigated CDs. SER was released from SER/ SBE- β -CD co-evaporate complex at 1:2 molar ratio at a percentage of $93.87\% \pm 0.049$. Hydrogel 1% and vaginal suppositories of 100 mg SER were successfully formulated and showed SER release of $95.42\% \pm 0.148$ and $96.31\% \pm 0.37$ respectively.

Conclusion: SER inclusion complex with SBE- β -CD enhanced the dissolution of the drug significantly. In addition, the optimum hydrogel formulation showed significant antifungal activity against *C. albicans* compared with hydrogel containing SER alone.