Univerza *v Ljubljani*
Fakulteta *za farmacijo*

SLOVENSKO FARMACEVTSKO DRUŠTVO
SLOVENIAN PHARMACEUTICAL SOCIETY

EUFEPS
European Federation for Pharmaceutical Sciences

EUROPEAN FEDERATION FOR MEDICINAL CHEMISTRY AND CHEMICAL BIOLOGY

BOOK OF ABSTRACTS

9th BBBB International Conference on Pharmaceutical Sciences

Pharma Sciences of Tomorrow

Ljubljana, Slovenia, 15th-17th September, 2022

https://bbbb2022.sfd.si/

Impressum

9th BBBB International Conference on Pharmaceutical Sciences Pharma Sciences of Tomorrow: Book of Abstracts

Editors: Aleš Obreza, Rok Dreu, Alenka Zvonar Pobirk, Barbara Sterle Zorec

Reviewers: Mirjana Gašperlin, Janez Ilaš, et al.

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Prepress design: Barbara Sterle Zorec, Alenka Zvonar Pobirk

Design: Sebastjan Jenko

Publisher: Slovensko farmacevtsko društvo in Univerza v Ljubljani, Fakulteta za farmacijo

URL address: The book of abstracts will be pdf format, available at:
https://bbbb2022.sfd.si/programme/scientific-programme/

Ljubljana, 2022

Kataložni zapis o publikaciji (CIP) pripravili v Narodni in univerzitetni knjižnici v Ljubljani
COBISS.SI-ID 120548355
ISBN 978-961-94230-4-2 (Slovensko farmacevtsko društvo, PDF)

Welcome letter

Dear colleagues,

We warmly welcome you to the 9th BBBB Conference in Ljubljana, where we have decided to continue the tradition of organizing international BBBB conferences after a break due to the Covid-19 pandemic. Unfortunately, the situation did not allow us to hold the meeting in 2021, when we celebrated three anniversaries, the 100th anniversary of the University of Ljubljana, the 70th anniversary of the Slovenian Pharmaceutical Society and the 60th anniversary of continuous pharmacy studies at the University of Ljubljana. The theme of this year's symposium is "Pharma sciences of tomorrow". The program consists of plenary and keynote lectures from different areas of pharmaceutical sciences, coming from all BBBB partners and broader scientific community. There will also be plenty of opportunity for younger researchers to present their results in the form of oral and poster presentations in an international environment. The conference will offer opportunities for exchange of scientific ideas between young and established scientists and professionals, as well as between people from academia, industry and regulatory authorities. At the conference, we invite you to also visit the capital of Slovenia, which was designated as the European Best Destination 2022 for 2022.

Conference Chair
Prof Dr Aleš Obreza

Chair of the Scientific Committee
Prof Dr Rok Dreu

General Secretary or the Conferece:
Assoc Prof Dr Alenka Zvonar Pobirk

CONTENT

(Photo: Zmajski most / The Dragon bridge; Luka Esenko, Ljubljana Tourism photo library)

P19

COMPARATIVE COMPRESSION CHARACTERIZATION OF LIQUISOLID SYSTEMS PREPARED WITH MESOPOROUS CARRIERS

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1. INTRODUCTION

Maintaining good compaction properties of liquisolid systems (LSS) is particularly challenging in the case of high-dose drugs [1]. High amount of liquid phase within LSS, required to dissolve/suspend higher amount of drug substance, while necessary for improvement of bioavailability, can cause difficulties during the tableting process, resulting in low tablet hardness or even inability of admixtures to be directly compressed. This has led to the development of new highly porous carriers, specifically designed for LSS, that can adsorb/absorb very high amount of liquid phase. The aim of this study was to investigate the compaction properties of LSS, prepared with three types of novel silica-based mesoporous carriers, using dynamic compaction analysis as a tool, with the focus on compressibility, compactibility and tabletability of these systems [2].

2. MATERIALS AND METHODS

2.1. Materials

Amorphous magnesium aluminometasilicate (Neusilin® US2, Fuji Chemical Industry Co, Ltd., Japan) and two types of amorphous mesoporous silicon dioxide (Syloid® XDP 3050 and Syloid® XDP 3150, Grace GmbH, Germany) were used as carriers. Colloidal silicon dioxide (Aerosil 200, Evonik Industries AG, Germany) was used as coating material and polyethylene glycol 400 (PEG 400, Fagron, Netherlands) was used as liquid phase.

2.2. Liquisolid Admixture Preparation

LS admixtures (Table 1) were prepared using Mycrolab fluid bed processor (OYSTAR Hüttlin, Germany), with the operating temperature of 30°C, inlet air flow rate of 20 m^3/h, and liquid feed rate of 12 g/min.

Table 1. Composition of prepared LS admixtures

Liquisolid admixtures[a]	R[b]	Liquid load	PEG 400 (%)
S1	10	0.7	38.9
S2	30	0.7	40.4
S3	10	0.6	35.3
S4	30	0.6	36.7
N1	10	1.1	49.8
N2	30	1.2	54.7

[a] type of carrier used: S1, S2 - Syloid® XDP 3050, S3, S4 - Syloid® XDP 3150, N1, N2 - Neusilin® US2; [b]carrier to coating material ratio

2.3. Powder density

LS admixtures' true densities were determined by helium pycnometer (AccuPyc 1330, Micromeritics, GA) while bulk and tapped densities were measured using a graduated cylinder and a volumeter (STAV 2003, J. Engelsmann AG, Germany).

2.4. Powder morphology

The morphology of LS particles was examined using a scanning electron microscope (SEM, Supra 35VP, Carl Zeiss, Germany).

2.5. Dynamic compaction analysis

Dynamic compaction analysis was performed on an instrumented tablet press (GTP D series, Gamlen Tableting Ltd, UK). 6 mm flat faced punches were used at a compaction speed of 60 mm/min, with compression load ranging from 250 to 500 kg, with a 50 kg increment.

3. RESULTS AND DISCUSSION

3.1. Compressibility of LS admixtures

Regardless of the compaction pressure applied and differences in liquid load, very high values of solid fraction were observed in LS compacts with Neusilin® US2 (0.90-0.94). On the other hand, LS compacts with both Syloid® XDP carriers exhibited lower relative density (0.59-0.89) that was affected by changes in the applied compaction pressure. Compressibility profiles suggest that carrier particle size and the amount of coating material used, had an effect on relative density. An increase in the amount of coating material used had a negative impact on compressibility and lower values of solid fraction were achieved.

3.2. Compactibility of LS admixtures

Admixtures N1 and N2 could be considered as having good compactibility [3]. Compacts with Neusilin® US2 achieved higher tensile strength values compared to compacts with Syloid® XDP, even at low compaction pressures. Particle geometry and shape (Fig. 1) can affect the way particles interact during tableting and therefore may affect their mechanical characteristics. Differences in particle size could be a reason for lower values of solid fraction and tensile strength observed in compacts prepared with Syloid® XDP 3150 compared to compacts with Syloid® XDP 3050 as carrier.

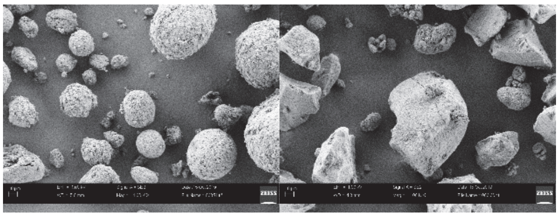

Figure 1. SEM micrographies of LS particles: admixture N1 (left) and S1 (right)

3.3. Tabletability of LS admixtures

Despite the significantly higher liquid load, better tabletability was observed in LSS with Neusilin® US2 as carrier with tensile strength ranging from 1,68 to 2,55 and 1,61 to 2,11 for formulations N1 and N2, respectively. Although relatively similar values of tensile strength were achieved, tabletability profiles indicate that there are differences in compaction behavior between formulations N1 and N2. Higher values of tensile strength observed at the same compression pressure indicate better tabletability of LS admixtures with Syloid® XDP 3050 compared to those with Syloid® XDP 3150 as carrier. Interestingly, formulations with Syloid® XDP 3050 had higher liquid load which implies that this formulation factor had lesser influence on tabletability compared to the properties of the carrier itself (such as particle size and specific surface area). The lowest tabletability was observed in LS admixtures S3 and S4 with compact tensile strength lower than 1 MPa at all but highest compaction pressure applied.

4. CONCLUSION

Out of the three investigated carriers, Neusilin® US2 showed the best compaction properties despite its high liquid load. LS admixtures with this carrier exhibited the highest values of tensile strength and solid fraction at relatively low compression pressures. Pronounced differences have been noticed between the two Syloid carriers, which indicates the effect of carrier particle size on compaction properties of LS admixtures.

5. REFERENCES

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ACKNOWLEDGMENT

This research was funded by the Ministry of Education, Science and Technological Development, Republic of Serbia through Grant Agreement with University of Belgrade Faculty of Pharmacy No: 451-03-68/2022-14/200161.