UNIVERSITI TEKNOLOGI MARA

SYNTHETIC STUDIES OF SOME PYRROLIDINE-2,3-DIONE TYPE COMPOUNDS

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Faculty of Applied Sciences

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi Mara. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Nitrogen containing heterocycles have attracted the interest of many research groups because they are widely found in nature as well as in pharmaceutical products. However, the syntheses of pyrrolidine-2,3-dione are rarely reported. In this study, 2,3-dioxo-4-carboxy-5-(substituted)pyrrolidines were synthesized to be potential intermediates for bioactive compounds. The key step in the synthetic strategy towards pyrrolidine-2,3-dione was the multicomponent reactions (MCR's) using sodium diethyl oxalacetate, various amines and aldehydes as the starting materials. Using this protocol, a series of 2,3-dioxo-4-carboxy-5-(aromatic or aliphatic)pyrrolidines were successfully produced in moderate to good yields. In similar investigation, a chiral amine, (*S*)-phenylethylamine was employed in order to confirm the stereochemistry of the functionality at the C-5 position of the pyrrolidine skeleton. Compound pyrrolidine-2,3-dione was then used as the intermediate for a few chemical transformations including the synthesis of C-4 alkylated compound which can be the advanced precursor for (*Z*)-pulchellalactam. Synthesis of novel γ-lactam β-lactone bicyclic ring and (-)-codonopsinine anologue, α-haloketo pyrrolidine were also attempted in other chemical transformations using pyrrolidine-2,3-dione as the intermediate. The chemical reactions employed to synthesize these target compounds were alkylation, stereoselective reduction, hydrolysis, decarboxylation, α-keto halogenation, *O*-protection and epoxidation. Therefore, *via* these various chemical reactions, over 40 pyrrolidinone type compounds have been successfully synthesized and 25 were identified as novel compounds. In summary, a few novel synthetic approaches towards the synthesis of some pyrrolidine type compounds of biological importance were devised using intermediate of 2,3-dixo-4carboxy-5-(substituted)pyrrolidine. Results extracted from this study might be used to develop new scientific knowledge and remarkable findings.

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I hope this thesis can give some guidance to next generation who need it.

Thank you.

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