An analytical quantification of clinical pharmacological research on the evidence-based pharmacotherapeutic applications of organoids

**ABSTRACT**

This clinical pharmacological research was conducted for systematically reviewing the evidence-based clinical pharmacotherapeutic applications of organoids, with thorough explanations and analysis of the medical study literature and evidence compiled from the innumerable studies conducted, thus authenticating the multidimensional pharmacomolecular significance of organoids. The objective of this clinical pharmacological research was an analytical quantification of the evidence-based pharmacotherapeutic applications of organoids. The study was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) Statement and Guidelines, 2009, described by the Cochrane Collaboration in June, 2016. At first, the steps of identification included the records which were identified through database searching and the additional records which were identified through other sources. This led to the steps of screening, which included the screened records after the duplicates were removed. From these screened records, few records were excluded, as per the exclusion criteria. Then, in the eligibility step, the full text articles were assessed for eligibility, from which few full text articles were excluded, according to the exclusion criteria, with adequate reasons. This led to the final inclusion step, where the studies were included in the qualitative synthesis of a systematic review, according to the inclusion criteria, and ultimately the studies were included in the quantitative synthesis. An analytical qualitative research was also conducted. The systematic review, contributed 307 refined and relevant medical records, among total 717 records obtained from the study databases search. It also described the clinical pharmacotherapeutic applications of organoids which elaborated this systematic review. In conclusion, this systematic review provided the refined qualitatively synthesised medical records, study literature and databases on the evidence-based clinical pharmacotherapeutic applications of organoids. The analytical clinical research qualitatively explained the systematic review.

**Key words:** Systematic review, Organoids, clinical pharmacotherapeutic applications, pharmacology, clinical pharmacological research.

**INTRODUCTION**

Organoids are three-dimensional cell structures, grown in vitro from the stem cells. These stem cells are mainly isolated from the biopsies or from the pluripotent stem cells, that are extensively similar to the endogenous organs, in both their structural development and functional performance. The organoids are formed of cells which differentiate, undergo spatially restricted lineage commitment, and acquire the specific tissue patterning to develop into several endoderm, mesoderm, and ectoderm-derived tissues. These organoids mostly tend to resemble...
the in vivo original organs, with the preservation of their genetic, phenotypic and behavioural traits. These are not only complex structures, but also possess unique capabilities of modelling human organ development and disease, showing wide similarities with the human organ system. This clinical pharmacological research was conducted for systematically reviewing the clinical pharmacotherapeutic applications of organoids, with thorough explanations and analysis of the medical study literature and evidence compiled from the innumerable studies conducted, thus explaining the multi-dimensional pharmacomolecular significance of organoids.

**Objective**

The objective of this clinical pharmacological research was an analytical quantification of the evidence-base pharmacotherapeutic applications of organoids. The systematic review was the qualitative exploration of the clinical pharmacotherapeutic applications of organoids, with quantitative interpretations.

**METHODS**

The study was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) Statement and Guidelines, 2009, described by the Cochrane Collaboration in June, 2016. At first, the steps of identification included the records which were identified through database searching and the additional records which were identified through other sources. This led to the steps of screening, which included the screened records after the duplicates were removed. From these screened records, few records were excluded, as per the exclusion criteria. Then, in the eligibility step, the full text articles were assessed for eligibility, from which few full text articles were excluded, according to the exclusion criteria, with adequate reasons. This led to the final inclusion step, where the studies were included in the qualitative synthesis of a systematic review, according to the inclusion criteria, and ultimately the studies were included in the quantitative synthesis. The study selection criteria were the following:

a. **The inclusion criteria:** The published articles on the evidence-based clinical pharmacotherapeutic applications of organoids; the original research studies, systematic reviews, meta-analyses, case reports, case series, narrative reviews, study series, parallel studies and similar kind of studies or reviews, of any or all types, which were either qualitative, or quantitative, or both qualitative as well as quantitative; the publication time-frame was chosen to be within a span of the past 3 years and any or all types of observational, descriptive and analytical research studies.

b. **The exclusion criteria:** Irrelevant studies and studies older than 3 years. Each study was assessed for allocation concealment, blinding, reporting of losses to follow-up or missing outcome assessments, evidence of important baseline differences between the groups, analysis on an intention-to-treat basis and use of a sample size calculation.

**RESULTS**

The results of this systematic review

In this evidence-based clinical research, in the identification stage, the study literature search on clinical pharmacotherapeutic applications of organoids, contributed 305 records in PubMed search, 104 records in EMBASE search, 210 records in Scopus search, and 98 records in additional databases search, identified through other sources. The total 717 records, after removing the duplicates, were 402. In the screening stage, the records screened were 402. From these records, 68 records were excluded, according to the exclusion criteria. In the eligibility stage, the full text articles assessed for eligibility were 334. From these records, 27 full text articles were excluded, according to the exclusion criteria. In the final inclusion stage, the records ultimately included in the qualitative synthesis, according to the inclusion criteria, was 307. These 307 records were the refined contributions of this systematic review. Thus, this systematic review contributed 307 refined and relevant medical records, among total 717 records obtained from the study databases search as depicted in Figure 1.

The selective investigative and experimental elucidations on the evidence-based clinical pharmacotherapeutic applications of organoids

From the analytical compilation of pharmacotherapeutic databases and evidences, the evidence-based clinical pharmacotherapeutic applications of organoids was also described in details to explain the conducted systematic review, qualitatively.

**DISCUSSION**

In this clinical pharmacological research study, in the identification stage, the study literature search on the evidence-based clinical pharmacotherapeutic applications of organoids, contributed 305 records in PubMed search, 104 records in EMBASE search, 210 records in Scopus search, and 98 records in additional databases search, identified through other sources. The total 717 records, after removing the duplicates, were 402. In the screening stage, the records screened were 402. From these records,
68 records were excluded, according to the exclusion criteria. In the eligibility stage, the full text articles assessed for eligibility were 334. From these records, 27 full text articles were excluded, according to the exclusion criteria. In the final inclusion stage, the records ultimately included in the qualitative synthesis, according to the inclusion criteria, was 307. These 307 records were the refined contributions of this systematic review.

The following selected qualitative investigative and experimental elucidations on the evidence-based clinical pharmacotherapeutic applications of organoids were described

The ultimate application of organoid technology is to use them for organ regeneration and replacement therapies, reducing whole organ trans plant requirements and improving the life quality of patients. The therapeutic use of organoids would be an alternative to the challenging transplantation of organs with a short period of viability outside the body, such as the heart and lungs. Organoids should highly impact regenerative treatments of organs that remain technically non-transplantable such as the brain. The recent development of edited pluripotent stem cells with targeted disruption of HLA genes by CRISPR/Cas9 technology should also facilitate the generation of immune-compatible healthy organoids for widespread therapeutic purposes. The regulatory frameworks and general guidelines required for organoids and their clinical applications, for example, drug testing using organoids in Europe, include “Guideline on the principles of regulatory acceptance of 3Rs (replacement, reduction, refinement) testing approaches” by the European Medicines Agency, the regulatory requirements for cell and gene-based therapies, and good manufacturing
practices (GMP) of a pharmaceutical drug, for the clinical use of organoids (Takahashi, 2019; Vives and Battle-Morera, 2020; Li et al., 2020; Lensink et al., 2020; Hsia et al., 2021). This clinical research provided the refined qualitatively synthesised medical records, study literature and databases on the evidence-based clinical pharmacotherapeutic applications of organoids with well-comprehensible elaborations.

CONCLUSION

Therefore, this clinical pharmacological research demonstrated that in the process of the systematic review, it contributed 307 refined and relevant medical records, among total 717 records obtained from the study databases search. It also qualitatively describes the clinical pharmacotherapeutic applications of organoids, which elaborated this systematic review further.

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REFERENCES


