A SYSTEMATIC LITERATURE REVIEW OF ALTERNATIVE OPTION FOR HALAL CRITICAL INGREDIENTS IN HALAL PHARMACEUTICAL AND COSMETICS

PRESENT BY FASHLI RAZAK

UNIVERSITY OF CYBERJAYA

Introduction

- Halal pharmaceuticals and cosmetic products are gaining awareness and increasing demand among the 2.4 billion Muslim consumers worldwide.

- The global halal market is anticipated to expand at a compound annual growth rate of 6.8% until 2024 **(Sugibayashi et al, 2019).** Halal pharmaceuticals are growing in recognition, and the global Halal pharmaceutical industry is worth some US$800 billion annually **(Nain et al., 2013).**

- The concept of Halal in pharmaceutical is relatively new to the global market **(Siddiqui, 2014)** which is hardly a surprise since the wider field of Halal logistics and supply chain management is still nascent **(Tieman, 2013).**

- Ingredients that are non conforming to the halal system often referred as critical ingredient **(Sugibayashi et al.,2019).**
- Currently, there are not many Systematic Literature Review (SLR) done on the alternatives of halal critical ingredients.
- SLR is needed to explore and identify knowledge gap on the alternative of halal critical ingredients.

Research Objectives

- ***General Objectives***

  - To review the current research development on the alternatives for halal critical ingredients in halal pharmaceuticals and cosmetics.

UNIVERSITY OF CYBERJAYA

Research Objectives

- ***Specific Objectives***

  - To perform descriptive analysis on the collected articles that were used in this study.
  - To identify the critical ingredients commonly used in the pharmaceutical and cosmetic industry.
  - To identify the alternative option for halal critical ingredients used in pharmaceuticals and cosmetics
  - To explore the testing methods used to test the alternative option for halal critical ingredients.

UNIVERSITY OF CYBERJAYA

Search String

Database	Keywords
MyCite	• Halal pharmaceutical • Halal cosmetics • Halal critical ingredients • Halal gelatin • Halal magnesium stearate • Shariah-compliant critical ingredients • Halal issues and challenges
PubMed	((“halal critical ingredient*” OR “non-syariah compliant excipient*” OR “shariah compliant critical ingredient*” OR “halal active ingredient*” OR “shariah critical ingredients” OR “halal in pharmaceutical” AND “Halal cosmetics” OR “ halal mushbooh ingredients” OR “halal issues” OR “halal challenges” OR “halal substance” OR “non-halal compound” OR “Islamic non- shariah compliance excipients”))

UNIVERSITY OF CYBERJAYA

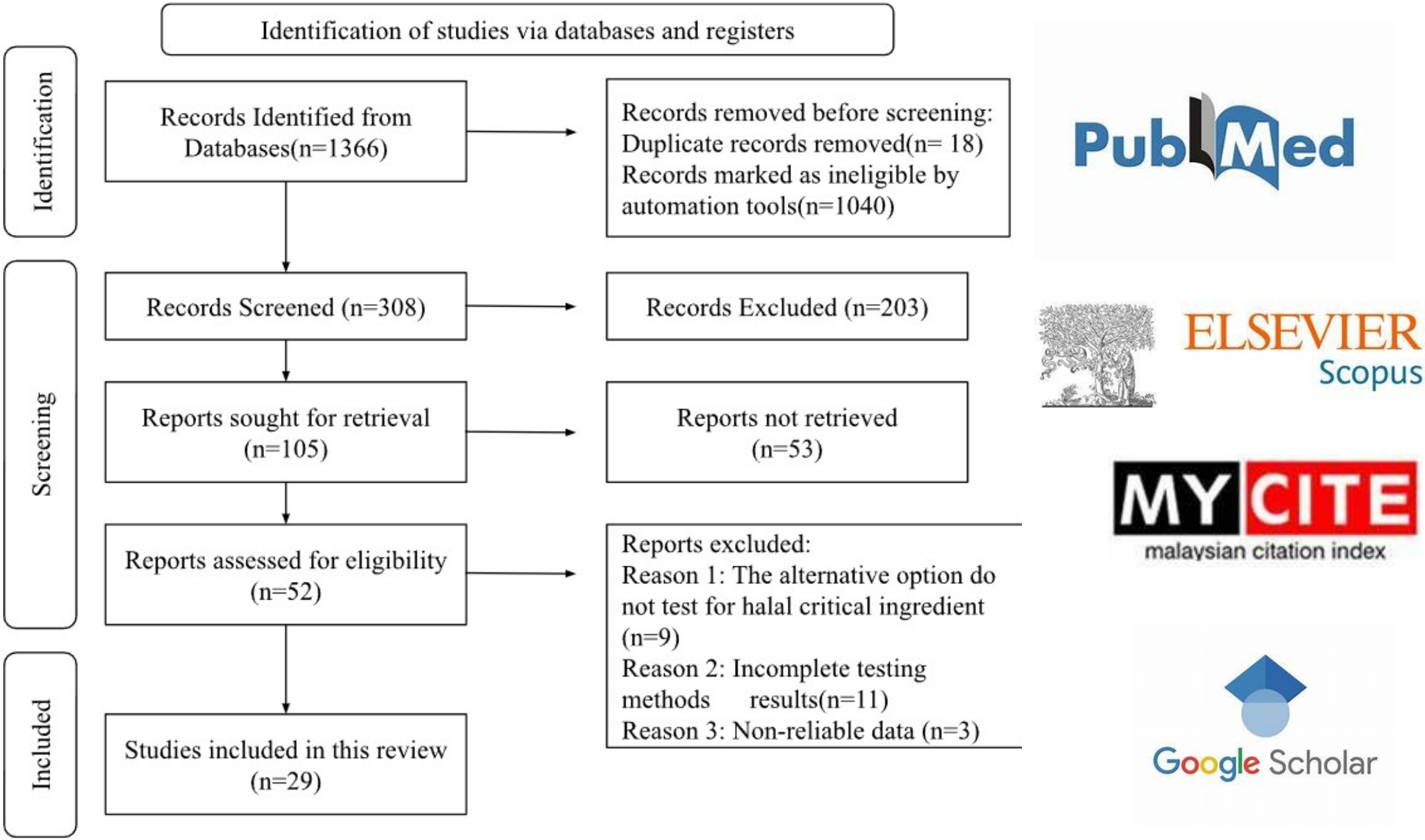
Search String

Database	Keywords
Scopus	TITLE-ABS-KEY ((“halal critical ingredient*” OR “non-syariah compliant excipient*” OR “shariah compliant critical ingredient*” OR “halal active ingredient*” OR “shariah critical ingredients” OR “halal in pharmaceutical” AND “Halal cosmetics” OR “ halal mushbooh ingredients” OR “halal issues” OR “halal challenges” OR “halal substance” OR “non-halal compound” OR “Islamic non- shariah compliance excipients”))
Google Scholar	((“halal critical ingredient*” OR “non-syariah compliant excipient*” OR “shariah compliant critical ingredient*” OR “halal active ingredient*” OR “shariah critical ingredients” OR “halal in pharmaceutical” AND “Halal cosmetics” OR “ halal mushbooh ingredients” OR “halal issues” OR “halal challenges” OR “halal substance” OR “non-halal compound” OR “Islamic non- shariah compliance excipients”))

UNIVERSITY OF CYBERJAYA

PRISMA FLOW CHART AND RESOURCE DATABASES

UNIVERSITY OF CYBERJAYA


Identification of studies via databases and registers
Identification
Screening
Included
Records Identified from Databases(n=1366)
Records removed before screening: Duplicate records removed(n= 18) Records marked as ineligible by automation tools(n=1040)
Records Screened (n=308)
Records Excluded (n=203)
Reports sought for retrieval (n=105)
Reports not retrieved (n=53)
Reports assessed for eligibility (n=52)
Reports excluded:
Reason 1: The alternative option do not test for halal critical ingredient (n=9)
Reason 2: Incomplete testing methods results(n=11)
Reason 3: Non-reliable data (n=3)
Studies included in this review (n=29)
PubMed
ELSEVIER
Scopus
MYCITE
malaysian citation index
Google Scholar

Inclusion and Exclusion Criteria

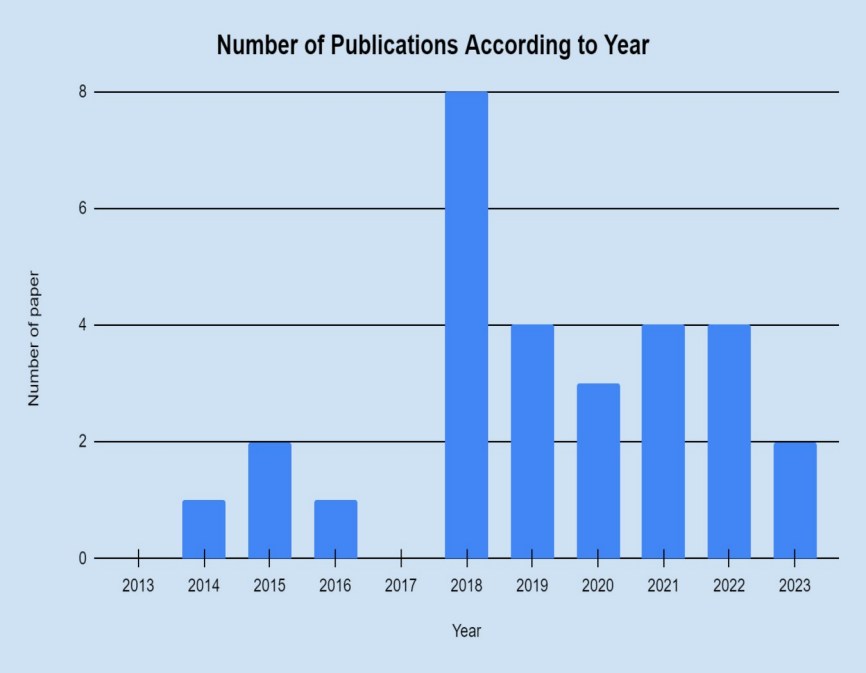
INCLUSION CRITERIA	EXCLUSION CRITERIA
Malay and English Language publication	Publications other than Malay and English language.
Any publications from 2013 until 2023.	Publications that are not related to research questions, review articles and objectives.
Original research articles	

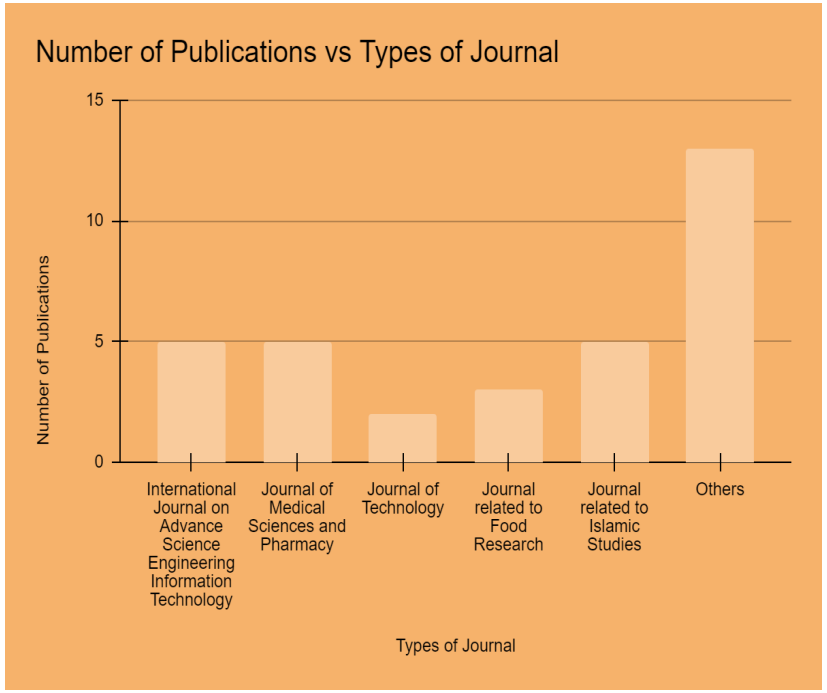
Results and Discussion

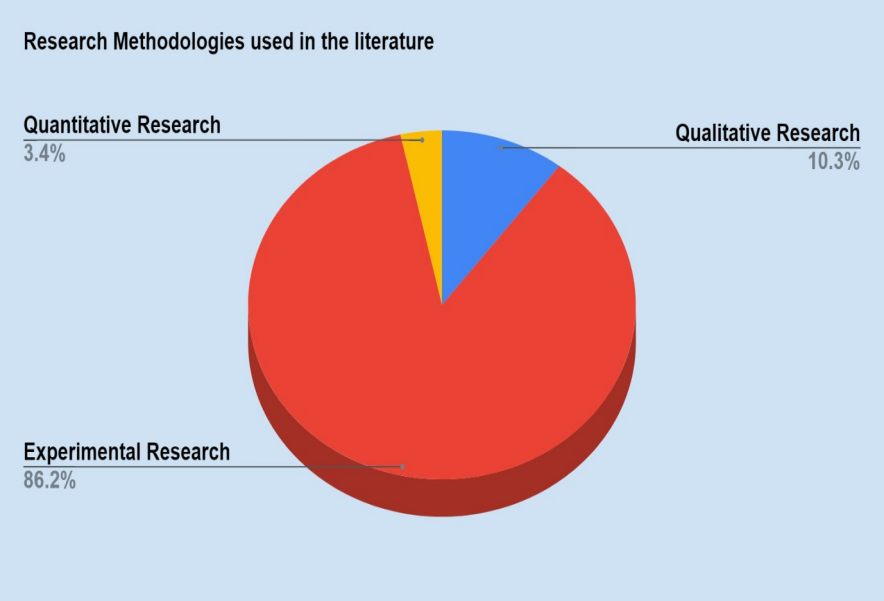
UNIVERSITY OF CYBERJAYA

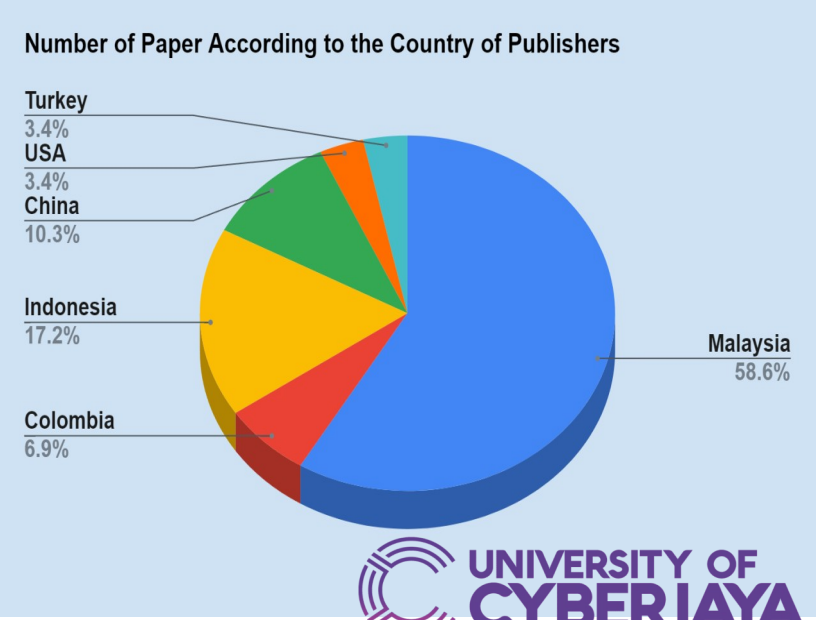
Objective 1 :

To perform descriptive analysis on the collected articles that were used in this study.









UNIVERSITY OF CYBERJAYA

Objective 2 :
To identify the critical ingredients commonly used in the pharmaceutical and cosmetic industry.

Themes	Sub-Themes
Pharmaceutical	Magnesium Stearate, Insulin
Cosmetic	Keratin, Hyaluronic Acid, Allantoin and its derivatives, Collagen,Protease Enzyme, Riboflavin, Fast Yellow AB, Mono Starch Phosphate, Tertbutylhydroquinone (TBHQ), Chrysoine Resorcinol, Quinoline Yellow, Carmoisine/Azorubine,Amaranth Dye, Erythrosine BS,Red 2G,Patent Blue V,Indigo Carmine/Idigotine,Chlorophyll,Copper Complex of Chlorophyll
Cosmetic and Pharmaceutical	Gelatin, Glycerin and its derivatives

Themes	Sub-themes/ Supporting Evidence
Pharmaceutical	**Magensium Stearate** - Chemometric investigation indicates that magnesium stearate from bovine (animal) sources is not halal, while plant (vege) and kosher sources are permissible (Razak et al.,2020). - According to the FTIR study, three sources indicate no substantial variations between the principal peaks of the FTIR raw spectra, hence their halal standards are doubtful (Razak et al.,2020). **Enzyme (Trypsin in Insulin)** - Study showed it is halal if the animal is slaughtered according to Syariah law, but not halal if the enzyme is derived from a non-halal animal (Jaludin et al., 2018).
Cosmetic	**Keratin** - Protein is often present in human hair and soybeans. It is considered haram if derived from human hair or haram animal protein (Ramdania et al.,2022). **Hyaluronic Acid** - Found in ocular fluid and the foetus. Haram if it comes from humans and animals (Ramdania et al.,2022). **Collagen** - Animal-derived collagen does not conform to the halal system, whereas plant-based collagen is

Objective 3 :

To identify the alternative option for halal critical ingredients used in pharmaceuticals and cosmetics

Themes	Sub-Themes
Plant-based ingredient	Okara, Gum Arabic, Aquilaria malaccensis Leaf, Pea protein isolate, plant-based cellulose, flower extracts, Bolanthus spergulifolius (Caryophyllaceae), Acer truncatum leaves, Curcumin, Moringa Oleifera Leaves, Xanthan Gum, Pectin(Mango peel), Brewer's Rice
Animal-based ingredient	Cyprinus Carpio, Camel Skin, Cobia (Rachycentron canadum) skin
Marine-based ingredient	Seaweed, Microalgae
Microbe-based ingredient	Bacteria- producing cellulose, Amillariella Mellea

Themes	Sub-themes
Plant-based Ingredient	**Okara** - Acts as a substitute for important ingredients in cosmetics. Okara oil contains a high concentration of functional lipids, making it a viable alternative source of essential oil for cosmetic purposes. Okara shown excellent potency as a functional cosmetic ingredient, primarily for improving skin conditions, acting as a skin whitening agent, and providing UV ray protection (Payyadhah et al.,2023). **Gum Arabic** - Alternative to gelatine, a versatile hydrocolloid. It is an important hydrocolloid used in pastille production that acts as a stabiliser and fat emulsifier. The results revealed that the optimal formulation in terms of physicochemical properties, antioxidant activity, and sensory acceptability was a sample containing 12% gum Arabic and 4% gelatin. Thus, gum Arabic is an appropriate alternative to gelatine (Zin et al.,2023).

Themes	Sub-themes
Animal- based Ingredient	**Cyprinus Carpio** **-** An alternative to non-halal animal collagen. The study found that the yield of collagen from carp is around 8.62%, with the characteristic of yellowish-white and a pH of 6.59. Furthermore, the analysis of the carp reveals a fibril structure with chemical interactions dominated by amide groups (Oktarlina et al.,2022). **Camel Skin** - An alternative to commercial gelatin. According to the study, the maximum gelatin output from camel skin (29.1%) was produced after 2.58 minutes at 71.87 degrees Celsius and pH 5.26. The study of camel skin gelatin nanoparticles and their functional properties demonstrated a high appropriateness for both food and non-food applications (Ahmed et al., 2020).

Objective 4 :

To explore the testing methods used to test the alternative option for halal critical ingredients.

Themes	Sub-Themes
Morphology Analysis	Scanning Electron Microscopy, Field Emission Scanning in Electron Microscopy, X-ray diffraction method
Functional groups and Chemical bond Analysis	Fourier-Transform Infrared, UV-Vis spectrophotometer, Gas chromatography-mass spectrometry,
Particle Size Analysis	Particle Size Analyzer
Texture profile Analysis	Texture Analyzer, Brookfield DV-III Viscometer
Activity Analysis	2, 2-diphenyl-2-picrylhydrazyl (DPPH) Scavenging assay, Disc Diffusion Method , Thiazolyl blue tetrazolium bromide (MTT) assay,Quantitative reverse transcription polymerase chain reaction (qRT-PCR),Ferric reducing antioxidant power assay
Component/ Content Analysis	HPLC System, Chemometrics, Folin-Ciocalteu method, LC-MS/MS Analysis, Amino acid analyser, Modified Quartz Crystal Microbalance (QCM) sensor method
Zeta potential analysis	Zeta potential Analyser

Themes	Sub-themes
Morphology Analysis	**(Scanning Electron Microscopy) SEM** - The collagen morphology revealed a heterogeneous fibril form, while micro collagen revealed homogeneous particles (Oktarlina et al.,2022). - SEM analysis revealed a fine-stranded network structure with thin connective walls in 10% and 13% protein gels made at pH 3.4. The morphology explain the gel's transparency since the homogeneous fine-stranded network allows more light to pass through without scattering (Zhu et al.,2022). - SEM was used to investigate the morphology of bacterial cellulose. The scanning reveals the compact structure of cellulose generated using the air-drying process. (Awang et al.,2018).

Themes	Sub-themes
Functional Groups and chemical bond analysis	**(Fourier-Transform Infrared) FTIR** - This study used FTIR to determine the collagen's functional groups and chemical bonds. The results indicated the presence of both an amide A bond and an amide B position. (Oktarlina et al., 2022). - The study results showed that both spectra of lard and EVOO seem fairly similar. However, they revealed some differences in peak intensities and the specific wavenumbers at which the highest absorbance were seen in LD(Lard) and EVOO, due to the different nature and composition of both LD and EVOO (Rohman at al.,2014).
Particle Size Analysis	**(Particle Size Analyzer)PSA** - PSA was used to measure the size and distribution of micro-collagen particles.The obtained results ranged from 668 nm (d10 < 10%) to 1581 nm (d90 < 90%). The micro-collagen particle size with the highest distribution intensity was 1146 nm (Oktarlina et al.,2022).

Conclusion

- In conclusion, this study suggested alternative options for halal critical ingredients in halal pharmaceuticals and cosmetics
- Among the articles that were collected for this review study, insulin, and gelatine are the most commonly studied.
- The alternative options whether it's from plant sources, marine sources, or microbe-based ingredients are tested extensively to assess for their desired effect or activity.
- The testing methods proved that the alternative options are much better than the critical ingredients in terms of their texture, morphology, activity, composition, and even the cost of synthesis

UNIVERSITY OF CYBERJAYA

Recommendations

- Develop better keyword and search strings to ensure more publications that are related to the research study can be retrieved.
- Include other databases during systematic review process.

UNIVERSITY OF CYBERJAYA

References

- Sugibayashi K, Yusuf E, Todo H, Dahlizar S, Sakdiset P, Arce FJ, et al. Halal cosmetics: A review on ingredients, production, and testing methods [Internet]. MDPI. Multidisciplinary Digital Publishing Institute; 2019 [cited 2023Mar14]. Available from: https://www.mdpi.com/2079-9284/6/3/37
- Khattak JZK, Anwar Z. (PDF) concept of Halal Food and biotechnology - research gate [Internet]. Concept of Halal Food and Biotechnology. researchgate; 2011 [cited 2023Mar14]. Available from: https://www.researchgate.net/publication/224910279_Concept_of_Halal_Food_and_Biotechnology
- De Luca M, Pappalardo I, Limongi AR, Viviano E, Radice RP, Todisco S, et al. Lipids from microalgae for cosmetic applications [Internet]. MDPI. Multidisciplinary Digital Publishing Institute; 2021 [cited 2023Mar14]. Available from: https://www.mdpi.com/2079-9284/8/2/52
- Tsang A. Malaysia: A Leading Global Halal Food Hub [Internet]. HKTDC research. HKTDC research; 2017 [cited 2023Mar15]. Available from: https://research.hktdc.com/en/article/MzgzNzA1MDYx#:~:text=Back%20in%201974%2C%20Malaysia%20introduced,of%20the%20Prime%20Minister's%20Office.

UNIVERSITY OF CYBERJAYA

References

- Coppola, D., Oliviero, M., Vitale, G. A., Lauritano, C., & Iannace, S. (2020). Marine Collagen from Alternative and Sustainable Sources: Extraction, Processing, and Applications. *Marine Drugs*, *18*(4). https://doi.org/10.3390/md18040214
- Kiss, A., Olah, J., Lakner, Z., Krisán, E., & Popp, J. (2020, May 7). *PRISMA statement for reporting literature searches in systematic ... - MDPI*. PRISMA Statement for Reporting Literature Searches in Systematic Reviews of the Bioethanol Sector. Retrieved March 31, 2023, from https://res.mdpi.com/d_attachment/energies/energies-13-02323/article_deploy/energies-13-02323-v2.pdf
- CD, M. (2023, January 4). *Research guides: Systematic reviews: Prisma Diagram & Checklist*. Humber. Retrieved April 1, 2023, from https://guelphhumber.libguides.com/c.php?g=213266&p=1406923#:~:text=What%20is%20PRISMA%3F,a%204%2Dphase%20flow%20diagram.
- Sarriff, A. (2013). Exploring the Halal Status of Cardiovascular, Endocrine, and Respiratory Group of Medications. *The Malaysian Journal of Medical Sciences : MJMS*, *20*(1), 69. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3684379/

UNIVERSITY OF CYBERJAYA

Acknowledgement

- Sharanyha Ganesan
- Assoc Prof Dr Najwa Mohamad
- Manisha Pandey
- Prof Dr Liew Kai Bin
- Dr Ahmad Rashidi Tahir
- Assoc Prof Dr Suraiya Abdul Rahman

UNIVERSITY OF CYBERJAYA

THANK YOU

UNIVERSITY OF CYBERJAYA