CAPSULE SHELL OF PHARMACEUTICAL PRODUCTS IN MALAYSIA; THE SOURCES AND HALAL STATUS

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ABSTRACT

Malaysia is the first country in the world which has successfully come out with a general guideline for halal pharmaceuticals. As a new sector, halal pharmaceuticals offers a lot of opportunities for industrial player, but also challenges that need to be accepted. Gelatine is one of the big issues in producing halal pharmaceutical products. 46% of gelatine worldwide is produced from pig-skin, and this source is prohibited for Muslims consumption. Pharmaceuticals and nutraceuticals are the second and third biggest application categories of gelatine after food, accounting for 26 percent and 21 percent respectively of the total market, implying a $1.3 billion market in 2015. One of the common usage of gelatine in pharmaceutical sector is for production of capsule shell. The study aims to produce a statistic on the sources of capsule shell and their halal status for all pharmaceutical products registered in Malaysia. METHODOLOGY: A text analytical method, Information Extraction Technique has been applied, to extract the data from different national databases on capsule shell sources of pharmaceutical products and their halal status. RESULT & DISCUSSION: 3085 pharmaceutical products in capsule dosage form have been included in the study. Their capsule shells were produced from porcine (0.03%), bovine (61.5%), vegetable (33.5%), plant origin (0.3%), fish (0.6%) and hypromellose (4.1%). The halal certification of these capsule shells have been categorized into 7 categories; A (28.1%), B (25.3%), C (2.6%), D (35.1%), E (1.0%), F (2.2%) and G (5.7%). Bovine capsule shell has the largest percentage of use in pharmaceutical products. The largest halal certification category, D, represents capsule shell which have been certified Halal by foreign certification bodies recognized by JAKIM. CONCLUSION: A minimum usage of porcine capsule shell in preparation of pharmaceutical products is a calming fact for muslim consumers. However, the bovine capsule shell need to be examine further, to ensure the bovine hide or skin used were slaughtered according to Shariah Law. The high percentages of pharmaceutical products and capsule shells with local (JAKIM) halal certification indicate a positive attitude among manufacturers and consumers on halal certification, especially JAKIM’s.

Field of Research: halal, gelatine, capsule shell, pharmaceuticals, JAKIM halal certification, foreign halal certification bodies

INTRODUCTION

Among available commercial hydrocolloids, gelatine has been regarded as special and unique, serving multiple functions with a wide range of applications in various industries [1]. Gelatine is a protein substance derived from collagen, a natural protein available in the tendons, ligaments, and tissues of mammals. Generally, all pig-derived and non-slaughtered ruminant-derived gelatine are prohibited for Muslim and Jewish [2]. Hindus do not consume cow-derived products, while Orthodox Buddhist avoid eating meat and fish out of respect of life [3]. Unfortunately, both porcine-based and bovine-based gelatine statistically are the first and second biggest source of gelatine, respectively. From annual global production of gelatine, the distribution of sources as follows; pig skin-derived gelatine (46%), bovine hides (29.4%), bones (23.1%), and other sources (1.5%) [1].

Pharmaceuticals and nutraceuticals are the second and third biggest application categories of gelatine after food, accounting for 26 percent and 21 percent respectively of the total market, implying a $1.3
billion market in 2015 [4]. The application of gelatine in the manufacturing of pharmaceutical products has been practiced since 19th century, and might be earlier. Nowadays, gelatine commonly used in two-pieces hard capsules, soft elastic gelatine capsules, tablet as a binder during granulation process, tablet coating, glycerinated gelatine in suppositories as vehicle during insertion into rectum, as stabilizer and texturing agent in an oil emulsion, microencapsulation, absorbable gelatine sponge which being used to control bleeding during surgery, as plasma substitute during emergency surgery, water-insoluble absorbable gelatine film, pastilles and troches which usually being consumed to reduce cough, and also in bacteria growth media, a useful diagnostic and research tool [5]. Pharmaceutical capsule shells have been produced almost exclusively from gelatine [6]. This fact creates a significant religious issues. Nowadays, there have been researches conducted to explore potential gelatine alternatives such as fish, poultry, microbes, and plant-based sources like pectin, agar and carrageenan [1].

The study aims to produce a statistic on the sources of capsule shell and their halal status for all pharmaceutical products registered in Malaysia. The results of the study will show us, especially the health policy makers, industrial players and healthcare practitioners, the reality of registered pharmaceutical products in Malaysia, in term of halal certification perspective.

METHODOLOGY

Study Design
One of text analytic methods, information extraction technique [7] has be applied to assess the data on pharmaceutical products in capsule dosage form registered in Malaysia from National Pharmaceutical Regulatory Agency (NPRA). Traditional information extraction technique has been chosen, where the template slot was well defined [8]. The templates was “capsule” dosage form. Unsupervised Information Extraction from Unstructured, Ungrammatical Data Sources technique [9] has been adapted in the technique, with human intervention, due to databases from NPRA are not presented in grammatical sentences or essays. The halal certification status of the products which have been extracted from NPRA database, has been checked by utilizing Department of Islamic Development Malaysia (JAKIM) database and JAKIM-recognized halal certification database.

All pharmaceutical products in capsule dosage form consist of prescriptive medicines, non-prescriptive medicines or over-the-counter (OTC) products, health supplement and traditional medicine, with registration number’s end code A, X, N and T, respectively [10] has been included in the study. There are two exclusion criteria for the pharmaceutical products in capsule dosage form; undeclared capsule shells sources and declared capsule shells sources without supporting documents or evidences.

Study Instrument
Data on pharmaceutical products in capsule dosage form have been extracted from NPRA protected and confidential database. Only limited data related to the research could be extracted. The halal certification status for each product has been confirmed through Halal Directory [11] for Malaysian (JAKIM) halal certification and Halal Verified Engine (HVE) [12] for halal certification by foreign certification bodies. Both Halal Directory and HVE are open databases.

There are 6 sources of capsule shells; bovine, porcine, vegetable, hyromellose, fish and plant origin. The halal certification status has been categorized into 7 codes; A, B, C, D, E, F and G. The followings are the interpretations for each code:

<table>
<thead>
<tr>
<th>Code</th>
<th>Interpretation: halal certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>JAKIM halal certification for the product</td>
</tr>
<tr>
<td>B</td>
<td>JAKIM halal certification for the capsule shell used for the product</td>
</tr>
<tr>
<td>C</td>
<td>Halal certification by foreign halal certification bodies recognised by JAKIM, for the product</td>
</tr>
</tbody>
</table>
D Halal certification by foreign halal certification bodies recognised by JAKIM, for the capsule shell used for the product
E Halal certification by foreign halal certification bodies unrecognised by JAKIM, for the product
F Halal certification by foreign halal certification bodies unrecognised by JAKIM, for the capsule shell used for the product
G None

**Study Site**
There are two study sites in this study. NPRA is an agency under pharmaceutical service division, Ministry of Health. While JAKIM is a department under Prime Minister's Department. Both are government institutions, but under different Ministries. An investigator has been appointed at each site. Medical Research Ethics Committee (MREC) approval has been applied, to conduct the study at NPRA.

**Study Procedure**
Approvals from Director of NPRA and MREC have been applied and obtained prior to the research. The data extracted from NPRA was categorized into 2 phases. The 1st phase was the data which has been automatically extracted, by using the template, “capsule” dosage form. The data consists of products’ name, registration number and their respected sources of capsule shell. The investigator analysed the products’ halal certification status by using two open databases; JAKIM Halal Directory and Halal Verified Engine (HVE). The list of products with halal certification code A and C have been produced.

The 2nd phase was the data extracted normally from NPRA database, for each pharmaceutical products which have not been included into code A and C. This extraction process took 5 weeks of extraction period. The data extracted are the documents or evidences related to manufacturers or suppliers of capsule shells that were being used for all respected pharmaceutical product in capsule dosage form, such as certificate of analysis and certificate to verify the source of capsule shell. Based on the documents or evidences, the halal certification status for capsule shells have be checked by using the same open databases; JAKIM Halal Directory and Halal Verified Engine (HVE). Thus, the list of products with halal certification code B and D have been produced.

The products or capsule shells with halal certifications unrecognized by JAKIM, have been listed into halal certification code E and F, respectively. The products without any halal certification have been put under certification code G.

**Study Analysis**
A descriptive analysis has been conducted using frequency. The variables are sources of capsule shell and halal certification codes.

**RESULT**
There are total 3085 pharmaceutical products have been included in the study. Another 3506 pharmaceutical products have been excluded, due to the exclusion criteria. A descriptive statistic using frequency [13], in two variables as follows:

<table>
<thead>
<tr>
<th>Sources of capsule shell</th>
<th>Porcine</th>
<th>Bovine</th>
<th>Vegetable</th>
<th>Plant origin</th>
<th>Fish</th>
<th>Hypromellose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of products</td>
<td>1</td>
<td>1896</td>
<td>1032</td>
<td>10</td>
<td>18</td>
<td>128</td>
</tr>
</tbody>
</table>

E-PROCEEDING OF THE 1ST INTERNATIONAL CONFERENCE ON HALAL GLOBAL (ICOHG 2018).
Organized by [https://worldconferences.net](https://worldconferences.net)
DISCUSSION

Total pharmaceutical products with valid registration until early year 2018 are 6591 products. 2023 products have been exclude due to undeclared sources of capsule shells. 1482 products have been further excluded because of unavailable supporting evidences or documents on the declared sources of capsule shells. All the data was obtained from NPRA database, through information extraction technique [7]. Thus, the remaining 3085 products were included in the study.

There are 6 types of capsule shell sources; porcine, bovine, vegetable, plant origin, fish and hypromellose. Porcine means pig-origin or pig-related [14]. Bovine refers to cow-derived such as cow hide [15]. Hypromellose also known as hydroxypropyl methylcellulose or HPMC [16]. Vegetable is a sub-category of plant origin, defined as “Edible plant parts including stems and stalks, roots, tubers, bulbs, leaves, flowers and fruits; usually includes seaweed and sweet corn; may or may not include pulses or mushrooms; generally consumed raw or cooked with a main dish, in a mixed dish, as an appetizer or in a salad” [17].

Based on the result, bovine capsule has the highest percentage (61.5%), followed by vegetable (33.5%) and hypromellose (4.1%). Porcine capsule has the lowest percentage (0.03%). This result is contrary with the statistic on annual global production of gelatine, with distribution of sources as follows; pig skin-derived gelatine (46%), bovine hides (29.4%), bones (23.1%), and other sources (1.5%) [1]. A market analysis on gelatine has conducted by Grand View Research, which shows pig skin as the majorly used raw material, representing for 40.6% of the market volume in 2015 owing to the high level of collagen content. However, increasing occurrences of seasonal disorders related with swine is expected to abstain gelatine manufacturers for procuring pig skin as a raw material. Cattle (bovine) bones are anticipated with the fastest growth at a CAGR of 4.9% from 2016 to 2024, in terms of volume. The high expectation is due to the increasing popularity of halal foods in food & beverage industry of Middle East countries [18].

The high percentage of vegetable hypromellose capsules are in line with the analysis conducted by Zion Market Research, which expected global vegetarian capsules market to reach USD 509.13 million by end of 2022, growing at a CAGR of 10.6% between 2017 and 2022 [19]. The low percentage of fish gelatine capsule may due to currently developing technologies factor. Fish skin, horse hair, and sheep covering are raw materials for the production of gelatine. Technological advancement for the development of fish gelatine in China is anticipated to open new markets over the next eight years [18].

In 2010, the percentage distribution of population by religion in Malaysia are; Islam (61.3%), Buddhism (19.8%), Christianity (9.2%), Hinduism (6.3%), Confucianism, Taoism, and Tribal/folk/other traditional Chinese religions (1.3%), Unknown (1.0%), No religion (0.7%), and other religion (0.4%) [20]. The high percentage of Islam believers in Malaysia may be one of the factors for the low percentage of porcine capsule usage.
There are 7 categories for halal certification codes. JAKIM halal certification is the only national halal certification body in Malaysia. The country aims to become the role model in providing halal products and services. The objective complements well with Malaysia’s role as the Chairman of the 57-nation Organization of Islamic Conference (OIC) and its vision to emerge as the global halal hub [21]. In comparison with 9 foreign certification bodies, representing Asia, North America, Australia, New Zealand, Europe and South Africa, JAKIM is the strictest body in granting Halal certification to companies [22]. Collaboration with foreign Islamic bodies meant for monitoring Halal products imported into the country. Only Halal certificates awarded by foreign Islamic bodies recognized by JAKIM are acceptable [23]. However, the validity of recognition is only for 2 years. Review audit will be carried out after the expiration of the appointment period [24]. Currently, there are 67 foreign halal certification bodies recognized by JAKIM, from 41 different countries [25].

The largest percentage owned by halal certification code D, followed by A and B. Code E and F represent 2 lowest percentages. Code D has the highest percentage due to the majority of capsule shells used for production of pharmaceutical products are supplied from foreign manufacturers such as India, China, Thailand and Pakistan. The high percentage for code A and B, which representing JAKIM halal certification may due to higher preference among consumers, compare to other foreign halal logos [26,27]. The government involvement (JAKIM) in regulating and monitoring the Halal logo used on products is an important factor in convincing the consumers [27]. The same facts are the reasons for the low percentage of products with code E and F, which representing foreign halal certification unrecognized by JAKIM. They have confidence in the JAKIM regulations related to halal industries and a moderate confidence in foreign institutions [13]. The low percentage of products without any halal certification (code G) indicates the awareness of consumers on halal certification.

The discussion focuses on consumer’s perception and confidence as these factors reflect the manufacturers and industrial players’ initiatives in halal certification. The pharmaceutical products’ manufacturers face high mimetic and normative pressure in applying for halal certification. They incline to imitate other manufacturers that have proven successful track record on business operation and to avoid risks of losing potential customers [28].

CONCLUSION

The study objective to produce a statistic on the sources of capsule shell and their halal status for all pharmaceutical products registered in Malaysia has been achieved. The lowest usage of porcine capsule and biggest usage of bovine capsule are a calming fact for muslim consumers. However, the bovine capsule shell need to be examine further, to ensure the bovine hide or bone used were slaughtered according to Shariah Law. The high percentages of pharmaceutical products and capsule shells with local (JAKIM) halal certification indicate a positive attitude among manufacturers and consumers on halal certification, especially JAKIM’s.

The study is only limited to pharmaceutical products in capsule dosage form. In reality, there are many other applications of gelatine in pharmaceutical industry, apart from capsule shell [5]. Furthermore, apart from gelatine, there are many other animal sources, especially pig-derived materials which have been used in producing pharmaceutical products [29].

For future research, the suggestions are to produce a specific statistic for capsule shell of pharmaceutical products according to their categories; prescriptive medicines, non-prescriptive medicines or over-the-counter (OTC) products, new chemical entity, biologics, health supplement and traditional medicine. Furthermore, it would be beneficial to include all gelatine-based pharmaceutical products in the study, apart from gelatine-derived capsule shell.
REFERENCES


