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## Analysis of Korean Patent Information for Air Extraction Cupping Devices



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### ABSTRACT

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#### Keywords:

cupping, health insurance, international patent classification, Korean traditional medicine, patent

**Background:** The purpose of this study was to collate inventors' improvements of air extraction cupping technology by reviewing patent applications in Korea. The cost of procurement and use of air extraction cupping devices are covered by health insurance.

**Methods:** Patents registered in Korea for air extraction cupping devices from August 1992 to January 2018 (registration, expiration, rejection, abandonment, and disclosure) were analyzed to determine technology trends. The Korean patent search engine used was Kipris ([www.kipris.or.kr](http://www.kipris.or.kr)).

**Results:** Sixty-seven Korean patents for air extraction cupping devices were retrieved. Most patents focused on design of the top valve of the device, the device at the bottom, an internal device, and the disposable cupping glass. In total 17.9% of patents were registered and 64.2% were abolished [either from non-payment of registration fees (93%) or expiration of the patent after 10 years (7%)]. The average registration period was 3.7 years.

**Conclusion:** The patents retrieved for this study focused on the development of the air exhaust valve, disposable cups, and skin adhesion maintenance technology in cupping devices that use air extraction. The average registration period was 3.7 years, meaning the patents that were not commercialized, expired without additional registration renewals. It is important to acquire a New Excellent Technology certificate for a cupping device to promote commercialization.

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### Introduction

Negative pressure is created inside the cups used for cupping therapy by using heat or a suction pump, thus permitting effective attachment to the skin. They are either used to affect the surface of the body or for bloodletting [1]. In Korea, cupping therapy has been covered by health insurance since 1987. Furthermore, disposable cupping glasses have been covered by health insurance since 2012, and it is suggested that they should be used for wet cupping, (also known as the dehematizing method) [2].

In 2017, the electronic air extraction cupping device was selected as an international standard. This standard specifies that the air extraction cupping device must use negative pressure for its operation [3]. However, it is possible that the technical

patent [4] may not conform with some parts of the standard. When the patent application becomes open to the public (after the application for the patent utility model is registered), this can be checked [5]. Nevertheless, even though there has been trend analysis in Korea for cupping therapy standardisation [6] no research has been conducted on patent analysis. This would give a greater understanding of the current state of research and technical design developments for the future. Thus, this study collected, organized, and analyzed patent information about air extraction cupping devices, in order to understand overall technical trends in their design, and to provide future directions for technical development.

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**Materials and Methods**

**Research subject and search method**

This study was conducted using Korean patent information analysis from August 1992 to January 2018 for air extraction cupping devices.

- 1) Search engine: patent information search service (www.kipris.or.kr).
- 2) Search date: 2018.11.23.
- 3) Search content: Korean patent utility model.
- 4) Search material and search formula (Fig. 1).

**Patent selection and extraction**

- 1) Patent subject: Korean patent information of an air extraction cupping device without electronics.
- 2) Patent status: registration, termination, rejection, waiver, exposure, withdrawal, null, and avoid.

**Patent classification and analysis**

An initial set of data was examined by 2 Korean traditional medical doctors. A total of 319 cases of patents for Korean air extraction cupping devices were retrieved, of which 67 patents were selected (Fig. 2). Patents were eliminated on the basis of irrelevant technical subject matter.



Fig.1 Search criteria.

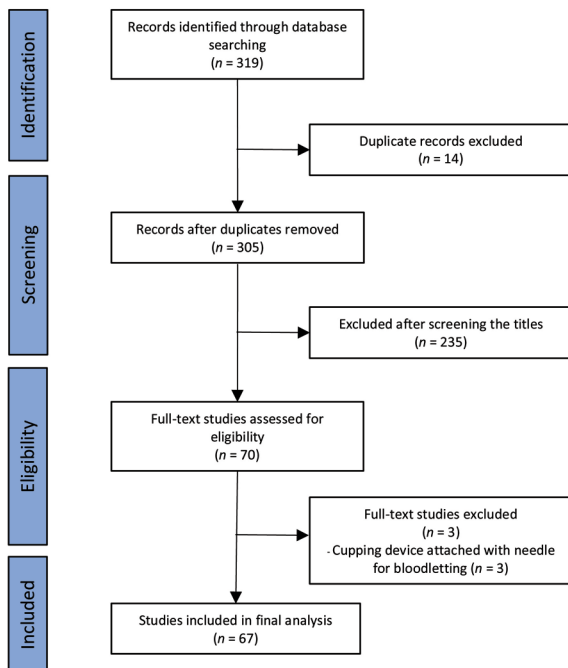


Fig. 2. Flowchart of study selection process.

**Results**

According to the annual patent application trend for air extracting cupping devices, the 67 cases selected in this study had patents that were submitted from August 1992 to January 2018.

The average number of patent applications was 2.5 cases per year (Fig. 3) of which 1 case was declined per year since 2013 (after a rapid increase from 1998). The year with the greatest number of applications was 1999, when 9 applications were submitted. No patent applications were made in 1996, 1997, and 2016. However, patent applications for the whole of 2016 were not open when this study was conducted, (because patent applications are only open to the public after a year and a half according to the patent disclosure system).

The importance of applying for patents was analysed in each field of technology and the technical fields of the patent were examined in detail. Table 1 represents the patent application status organised by the International Patent Classification (IPC) code. Cupping therapy is classified as A61M1 of the A61 category, which covers medical treatment, veterinary medicine, or hygiene sections of the IPC code. In addition, there are 10 cases related to acupuncture classified as A61H39, 1 case related to massage categorised as

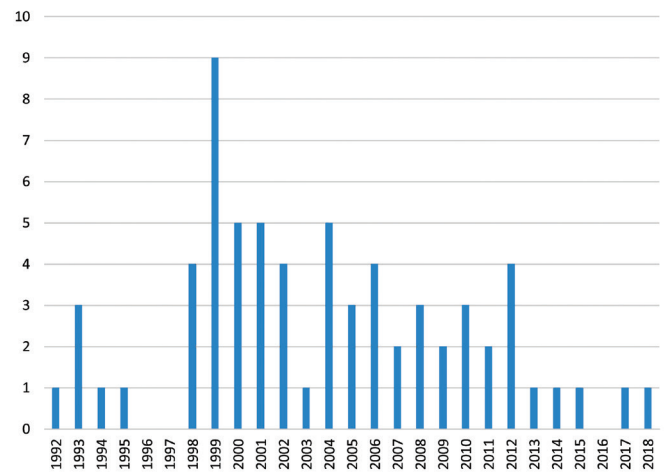


Fig. 3. Annual status of the number of patent applications for air extraction.

Table 1. Patent Application Status by IPC Code.

IPC Code	Contents	Number
A61M1/00	Suction or pumping devices for medical purposes	2
A61M1/08	Cupping glasses	65
A61F13/15	Absorbent pads	2
A61H39/04	Devices for applying pressure on such points	6
A61H39/08	Devices to apply needles to such points	4
A61H7/00	Devices for suction-kneading massage	1
A61H9/00	Pneumatic or hydraulic massage	11
A61M39/22	Valves or arrangement of valves	17
A61M39/24	Check or non-return valves	2

IPC, International Patent Classification.

A61H7, 11 cases related to air or water massage labelled as A61H9, 19 cases related to the valve used in the cupping device coded as A61M39, and 2 cases related to the absorbent pads classified as A61F13 (Table 1).

The 67 patents selected were analysed and classified according to the techniques they used. Among the 26 patents improving the top of the cupping device, there are 22 patents involved in enhancing the seal and valve function for quick intake and exhaust, 3 patents addressing valve location at the side of the vent valve, and 1 patent on the static pressure system used to help maintain a constant internal pressure on the cup. There were 13 patents on the lower half of the cupping device, 12 patents to improve skin adhesion, 9 patents for strengthening adhesion to the skin by using silicone (such as in silicon rims), and 3 patents concerned with changing the shape of the lower part of the cupping device (curved, square, or elliptical). There was 1 patent for attaching blood-sensitive sensors that could confirm whether a wetting procedure had been performed on the entry area. Of the 22 patents for internal devices, 10 patents were for dual devices using disposable caps, 8 patents were for acupressure devices, 3 patents were for blood-absorbing devices in wet procedures, and 1 patent was for a massage device. Of the other 6 patents, 4 patents were for disposable cups, 1 patent was for a device that maintained internal pressure, and 1 patent was for apparatus used in stacking the cups (Fig. 4).

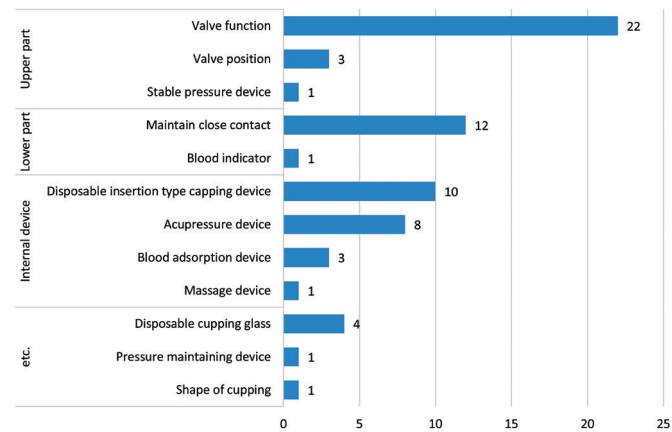


Fig. 4. Classification and number of patent applications for air extraction cupping devices.

Table 2. Patent Application Registration Status of Air Extraction Cupping Device.

Patent Status	Number
Rejection	6
Publication	1
Registration	12
Termination	43
Withdrawal	2
Waiver	3
Invalidity	0
Total	67

Combining all the typical patented technologies in cupping devices, and considering them together, there were 22 patents for valves related to absorbents, 15 patents for disposable cups, 12 cases related to skin tightness, 9 cases for additional modalities such as acupressure or massage, and 4 cases for shape of cupping.

According to the patent status report, 12 of 67 (17.9%) patents are currently registered, and the other 43 patents have been abolished from the system [64.1% (Table 2)]. The reasons for abolishment were the non-payment of registration fees in 40 cases (93%), and the passage of 10 years since the patent application was first registered (after which the patent expires), in 3 cases (7%).

The average registration period of 40 patents with a non-payment of registration fee is 3.7 years. Fourteen patents (35%) were registered for 1 year and 10 patents (25%) were registered for 3 years, all of which expired after their initial registrations without renewals. The number of patents whose registration was renewed before expiration was 3 [7.5% (Fig. 5)].

Twelve cases of patents that maintained their registration status have 4 cases of patents for disposable cupping devices, 4 cases

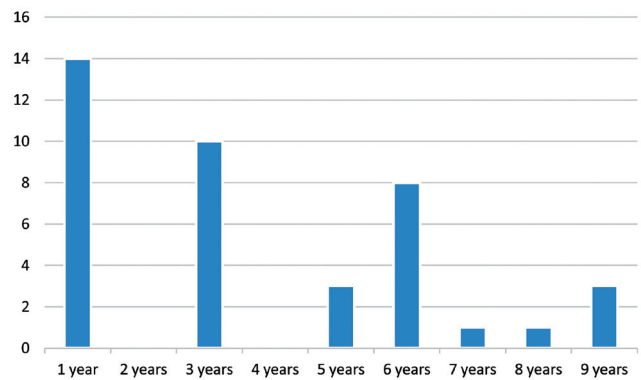


Fig. 5. The number of patent registrations over time for air extraction cupping devices.

Table 3. List of Patents That Maintained Their Registrations for Air Extraction Cupping Devices.

Title of invention	Year of application
Disposable sterilisation cupping device	2009
Valve and body for cupping glass and cupping glass usage	2009
Apparatus for acupressure and cupping treatment	2010
Cupping valve for airtightness	2010
Cupping with packing for airtightness	2010
Disposable sterilisation cupping device	2011
Apparatus for cupping	2012
Disposable cupping glass	2012
Stable pressure cupping device	2013
Disposable cupping glass	2014
Removable pads for a cupping cup	2015
Air vent device of cupping cup	2018

of patents for cupping device valves, 2 cases of patents for skin-adhesion maintenance systems, 1 patent for the acupressure apparatus, and 1 patent for the loading method used (Table 3).

## Discussion

Cupping therapy is one of the most commonly used traditional medical modalities used worldwide, over time. It is performed by inducing negative pressure inside cups to facilitate attachment to the skin. In order to create a vacuum, manual or electrical pumps create heat or suction. Cupping therapy has been used in the Middle East since 1550 B.C., and the spread of Islam enabled cupping therapy to be disseminated to other parts of the world. As for the East Asian region, cupping therapy was first used during the days of the Han dynasty and evolved into several variations, such as slide cupping, retained cupping. Cupping therapy has been used since the modern Greek era in Europe. As it developed and evolved, cupping therapy acquired names in the native languages of each country. For example, it is known as cupping therapy in English, ventouse in French, vanka in Russian, and schröpfkopf in German. Currently, cupping devices are one of the most commonly used modalities in traditional therapies through various techniques. Cupping devices are widely used and a number of manufacturers produce cupping device in many countries. However, there is no international standard for the manufacture of cupping devices [1,3].

From the perspective of safety, the cupping device comes in direct contact with the skin. In the case of wet cupping, and cupping for the purpose of bloodletting, the cups directly touch the bleeding wounds. To prevent infection, it is important to develop different cups according to their usage—depending on whether they are intended for intact skin or wounded skin. Additionally, as a cupping device is a medical tool that comes into direct contact with blood, it is necessary to use disposable cups [3].

In modern times, there is a global trend towards standardising traditional medicine. To conform to this trend, standardised medical devices and medical procedures including disposable needles and moxibustion were devised by Korean traditional medicine researchers. This followed the standardisation of human acupuncture points in 2008. In 2014, the Korean Medicine Research Institute proposed an air extraction cupping device that would conform to International Organisation for Standardisation. This device was chosen as an international standard in 2017, thus leading to the establishment of an international standards agenda, and the formulation of standardised test methods based on worldwide usage. This standard specifies the requirements for an air extracting type of cup that creates negative pressure (applicable to disposable and reusable cups). However, patents that use certain technological features may be in conflict with the international standard. This can be verified by looking at patent applications, utility model rights, and utility model registrations [4]. Thus, it is necessary to analyse quantitative information using the data from patents, reports, and papers before the enactment of industry standards. Quantitative evaluation using patent information can provide a more objective and accurate evaluation and analyses must be performed using data based on objective and constant criteria over a long period of time [5].

In addition to a deeper understanding of the research on the air extraction cupping device, it is necessary to comprehend current technology trends and predict the direction of technological development, as well as predict new areas of technology that can be applied to improve the devices. This information analysis was conducted only on patents related to the air extraction cupping device.

A Korean patent search engine ([www.kipris.or.kr](http://www.kipris.or.kr)) was used to search for all the air extraction types of cupping devices that are not dependent on an electric power supply. Low-frequency therapy, laser therapy, infrared therapy, phototherapy, electric moxa devices, anion generators, and heat or fomentation devices were excluded as they depend on an electric power supply.

Primary data were gathered using the search engine and reviewed by 2 Korean medical doctors. A total of 319 patents were found, and from them, the patents that were irrelevant to the technological field were removed. There were 67 patents selected for this study which were filed over 26 years, from August 1992 to January 2018. The average number of patents being filed per year was 2.5 however, there has been a rapid increase from 1998 (the highest amount was 9 cases in 1999), and a drop to 1 per year after 2013. There were no patent applications in 1996, 1997, and 2016. In accordance with the patent publication system, the patent applications are published 18 months after the date of application. Therefore, patents filed for the whole of 2016 may still be within their “priority deadline for publication” when this study was carried out (23 November 2018).

The patent application ratio was analysed by the technology field of the patent, and the subsections of the technological areas (where the patent was applicable) were examined. Cupping is classified as subclass A61M1 of class A61, which covers the categories of medical or veterinary science, and hygiene in the IPC code. In addition to cupping, class A61 includes 10 cases of acupressure sub classified as A61H39, 1 case of massage categorised as A61H7, 11 cases of air and water massage classified as A61H9, 19 cases involving the valve used in cupping labelled as A61M39, and 2 cases of absorbent pads categorised as A61F13. Because various patents are available to be added to the broad category of cupping, the 67 patents selected were analysed and classified as a representative technology by the authors regardless of IPC codes. The number of patents dealing with the upper part of cupping device is 26. Among them, 22 patents are concerned with the function of the valve for airtightness, quick intake, and exhaust; 3 patents for the positioning of the exhaust valve at the side of the cupping device; and 1 patent for a static pressure device for maintaining the negative pressure inside the cup. The number of patents for the lower part of the cupping device was 13. This included 1 patent for the blood sensor for wet cupping, and 12 patents for the maintenance of close contact between cups and the skin. Of these 12, 9 patents deal with silicon materials such as silicon rims to enhance attachment, and 3 cases concern changing the shape of the cups to be curved, square-shaped, or elliptical. One patent was for a blood sensor to check for the presence or entry of blood. A total of 23 patents were granted for the internal apparatus inside the cups. This included 10 patents for the double apparatus with a disposable insertion capping, 8 patents for blunt-edged apparatus for acupressure, 3 patents for blood absorption devices used for wet cupping, and 1 patent for a negative pressure maintenance apparatus. There were 5 patents other than those dealing with internal apparatus, comprising 4 patents for disposable cups, and 1 to modify the shape of the cups to facilitate easy stacking.

Representative patent technology is summarised as follows: the patents for the intake and exhaust valve systems occurred the most with 22 cases (32.8%); with 15 patents for disposable cups (22.3%); 12 patents for skin adhesion (17.9%); 9 patents related to additional modalities such as acupressure and massage (13.4%); and 4 patents related to changing the shape of cups (5.9%). Because an air-exhaust ventilation system was used, the proportion of cupping device-related patents was high. Practitioners now recognise the need to use disposable cups for wet cupping; thus,

patents on disposable cups were also trending upward. There was a patent for using a soft material such as silicone to increase the tightness between the cups and the skin. Finally, we have a patent for a device that applies acupressure and performs massage during cupping therapy.

Of the 67 patents, 12 were registered (17.9%), and 43 were abolished (64.2%). The reason for the abolishment is the non-payment of registration fees (40 cases, 93%), and the expiration of the patent after 10 years (3 cases, 7%). The average duration of patents abolished owing to non-payment was 3.7 years. Fourteen cases were abolished a year after the first registration, and 10 cases were abolished 3 years after the first registration without additional patenting. A total of 11 patents were held for 5 to 6 years after the second and third extensions, and 3 patents (7.5%) were registered for 9 years before their term finally expired. Unused patents disappear automatically without extensions because of unpaid registration fees that increase for patent extensions.

The registration for 12 patents had not expired and had been maintained. These 12 patents comprised 4 cases of patents for disposable cupping devices, 4 patents to improve the cupping valve, 2 patents on schemes to maintain stable pressure, 1 acupressure device patent, and 1 to improve the stacking method used while storing the cups. Maintaining the registration of patents means its holder is granted protection for his technologies as long as the registration is valid. Two patents for disposable cupping devices deal with the technology for inserting the second cup inside the original 1, and 2 cases were about the disposable cups themselves. The patents related to the valve were composed of 2 patents on the pressure maintenance device, 1 patent for positioning of the valve to the side of the cups, and 1 patent for a static pressure device to block excess pressure. There were 2 patents that described the use of soft pads or packing at the entrance of the cups to maintain a tight fit. There was 1 patent to add acupressure to cupping therapy, and 1 patent to increase efficient space utilisation by stacking the cups. Thus, the patents were focused on the development of the air exhaust valve, disposable cups, and skin adhesion maintenance technology in cupping devices that use air extraction.

Therefore, by analysing information about the patents related to air extraction cupping devices, we gained an in depth understanding of the current research, and we were able to identify developing trends and gain valuable technical information. In this study, a quantitative information analysis was carried out on patents of air extraction cupping devices. As a result, there were a number of patents for air extracting valve, disposable cupping, and skin adhesion technology. However, the average registration period of 40 patents with a non-payment of registration fee was 3.7 years. The patents that were not commercialized after their initial registrations expired without additional registration renewals. Fourteen patents (35%) were registered for 1 year and 10 patents (25%) were registered for 3 years, all of which expired after their initial registrations without additional registration renewals. There were 3 patents whose registration were renewed before expiration.

After patent registration, it is necessary for the inventor to acquire a New Excellent Technology certificate for the cupping device, and promote the new technology to enable commercialization.

It is reasonable to analyse air extraction cupping devices with multiple methods. However, since patent analysis is only possible within the scope of the information provided by the inventor, analyses from multiple perspectives may prove impossible. In addition, this study examined the patents registered in Korea alone. Analysis of patents worldwide would further advance our understanding of new technology in the field of air extraction cupping devices.

### Conflicts of Interest

The authors have no conflicts of interest to declare.

### Acknowledgements

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