This swallowable, self-inflating wonder drug may facilitate weight loss

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The EndoPil prototype capsule contains a balloon that can be self-inflated with a handheld magnet once it is in the stomach. (Image: NTU)

WASHINGTON D.C. [USA]: Scientists have developed a self-inflated capsule called *EndoPil* which helps in weight loss to tackle the growing global obesity epidemic.

The research was presented at Digestive Disease Week.

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inflation valve with a magnet attached, and a harmless acid and a salt stored in separate compartments in an inner capsule.

Designed to be swallowed with a glass of water, the capsule enters the stomach, where the acid within breaks opens the outer gelatine casing of the capsule.

Its location in the stomach is ascertained by a magnetic sensor. An external magnet measuring 5cm in diameter is used to attract the magnet attached to the inflation valve, opening the valve. This mechanism avoids premature inflation of the device while in the oesophagus, or delayed inflation after it enters the small intestine.

"The opening of the valve allows the acid and the salt to mix and react, producing carbon dioxide to fill up the balloon. The kitchen-safe ingredients were chosen as a safety precaution to ensure that the capsule remains harmless upon leakage," said Louis Phee, one of the researchers.

As the balloon expands with carbon dioxide, it floats to the top of the stomach, the portion that is more sensitive to fullness. Within three minutes, the balloon can be inflated to 120ml. It can be deflated magnetically to a size small enough to enter the small intestines.

Its magnetically-activated inflation mechanism causes a reaction between a harmless acid and a salt stored in the capsule, which produces carbon dioxide to fill up the balloon.

"Such an orally-administered self-inflating weight loss capsule could represent a non-invasive alternative to tackle the growing global obesity epidemic," said Phee.

Other alternative opted by moderately obese patients and those who are too ill to undergo surgery is an intragastric balloon, an established weight loss intervention that has to be inserted into the stomach via endoscopy under sedation.

It is removed six months later via the same procedure. As a result, not all patients are open to this option as the balloon has to be inserted into the stomach via endoscopy and under sedation.

It is also common for patients who opt for the intragastric balloon to experience nausea and vomiting, with up to 20 per cent requiring early balloon removal due to intolerance. The stomach may also get used to the prolonged placement of the balloon within, causing the balloon to be less effective for weight loss.

The EndoPill’s viability was first tested in a preclinical study, in which a larger prototype was inserted into a pig. The findings showed that the pig with the inflated capsule in its stomach lost 1.5kg a week later, while a control group of five pigs gained weight.
"EndoPill's main advantage is its simplicity of administration. All you would need is a glass of water to help it go down and a magnet to activate it. We are now trying to reduce the size of the prototype and improve it with a natural decompression mechanism. We anticipate that such features will help the capsule gain widespread acceptance and benefit patients with obesity and metabolic diseases," Phee added.

Professor Lawrence Ho, a researcher said, "EndoPill's compact size and simple activation using an external hand-held magnet could pave the way for an alternative that could be administered by doctors even within the outpatient, and primary care setting. This could translate to no hospital stay, and cost-saving to the patients and health system."

Each capsule should be removed within a month, allowing for shorter treatment cycles that ensure that the stomach does not grow used to the balloon's presence.

As the space-occupying effect in the stomach is achieved gradually, side-effects due to sudden inflation such as vomiting and discomfort can be avoided.

The team is now working on programming the capsule to biodegrade and deflate after a stipulated time frame, before being expelled by the body's digestive system. This includes incorporating a deflation plug at the end of the inner capsule that can be dissolved by stomach acid, allowing carbon dioxide to leak out. In the case of an emergency, the balloon can be deflated on command with an external magnet.