

## Natural treatments for erectile dysfunction: A focus on mobile health applications

Luigi Napolitano, Luigi Cirillo, Giovanni Maria Fusco, Marco Abate, Vincenzo Morgera, Gianluigi Cacace, Giuseppe Celentano, Biagio Barone, Lorenzo Spirito, Vincenzo Mirone, Roberto La Rocca

Department of Neurosciences, Reproductive Sciences and Odontostomatology, School of Medicine, University of Naples "Federico II", Naples, Italy.

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To the Editor,

Erectile dysfunction (ED) is defined as the persistent inability to achieve or maintain penile erection sufficient for satisfactory sexual performance (1). ED represents one of the most important male sexual dysfunctions with a prevalence of 52% and affecting more than 150 million men worldwide (estimated to be 322 million worldwide for 2025) (2-4). In the last years, several dietary supplements and herbal remedies have been introduced alone or in combinations with other treatments. These products have been used in traditional medicine for their aphrodisiac properties or as compounds that increase sexual arousal, libido, potency (erection) and/or sexual pleasure. *Panax ginseng* (Korean ginseng), *Tribulus terrestris* (Tribulus), *Epimedium gradiflorum* (Horny goat weed), *Lepidium meyenii* (Maca), *Ginkgo biloba* (Ginkgo), *Eurycoma longifolia* Jack (Tongkat ali), and *Pausinystalia johimbe* (yohimbine), B complex vitamins, zinc, trace minerals, L-arginine, aspartate and *dehydroepiandrosterone* (DHEA) have been reported as the most used products on the market (5-6). Despite the increasing use, very low scientific evidence has been described, particularly regarding efficacy, safety, extractions, and dosage. *Mobile phone applications* (MHAs) are mobile software programs, providing information and support to patients in many fields including health. Nowadays, more than 325,000 MHAs are available and widely used in the healthcare setting, to provide information about several medical conditions including sexual dysfunction, but the scientific evidence is very poor (7). In our previous study we analyzed MHAs for ED using the *Mobile Application Rating Scale* (MARS scale) and reported their adherence to European urology Guidelines. MARS is a multidimensional instrument evaluating engagement (items assessing the extent to which the app engages target users), functionality (items assessing how easy the app is to navigate and the overall app performance), esthetics (items assessing visual appearance and style), information (items assessing accuracy, quality, and quantity of the app), app subjective quality, and app-specific, showing a very acceptable reliability and validity (8). We found an overall low quality of MHAs and poor adherence to EAU guidelines. Among treatments they suggested there were both herbal interventions and non-herbal nutraceuticals, alone or in combinations. Over the time several studies suggested herbal interventions in ED management with a high scientific support. *Balasubramanian et al.* in a recent meta-analysis reported the most popular erectile dysfunction supplements available on online marketplaces: Ginseng is the most popular followed by L-arginine, and Tongkat ali (9). Interestingly, none of the analyzed apps reported any of the supplements in this list or the most popular used ones. Furthermore, ginseng and L-arginine as shown by *Borrelli et al.* are the only two supplements that showed an effective efficacy in ED treatment (10). MHAs suggested using (Table 1): *garlic*, *bryonia laciniata*, *butea superba*, *ginger*, *ginkgo Biloba*, *carrots*, *pomegranate juice*, *onion*, *almonds* and *clove*. Garlic (*Allium sativum*) represents one of the oldest plants, recognized for its health benefits in cardiovascular diseases (11). The most important bioactive component is *S-allyl cysteine* (SAC) which possesses antioxidant property (12). *Bryonia laciniata* is characterized by antimicrobial, larvicidal, anti-inflammatory, cytotoxic, analgesic, and antipyretic activities and it is very used in India as a tonic and enhancer of sexual behaviors. *Butea superba* increased intracavernous pressure and cavernous smooth muscle relaxation (13). One MHA suggested using *ginger*, the only nutraceutical that showed to enhance iNOS activity *in vitro*. Other MHA suggested products were carrots that improve sexual function and desire through testosterone enhancing; pomegranate juice which is characterized by antioxidant activity (anthocyanins) and involved in endothelial *nitric oxide* (NO) levels regulation; in the end, onion which is a source of hydrogen sulfide and quercetin, involved in erection and antioxidant pathway respectively (14, 15). Almond is characterized by antistress, antidiabetic, antihypertensive and antioxidant properties (16, 17). Many of these home remedies have not reported a great scientific support and few studies have been conducted on human, with several drawbacks: regarding garlic, *Nishimatsu et al.* reported his experience in 24 men using a preparation containing garlic extract, ginseng, oriental bezoar, velvet antler, cuscutea seed and epimedium herb, with improvement of ED (18). Despite all this, the negative role of oxidative stress and of endothelial dysfunction in ED pathophysiology is well established, and all dietary supplements suggested reported antioxidant effects. According to the current data no strong scientific evidence supports nutraceutical products suggested by MHAs. Therefore, further work, and more involvement of healthcare are necessary to improve the quality of scientific evidences reported by MHAs.

No conflict of interest declared.

**Table 1.**  
App characteristics.

Name of application	Android/Apple/Both	Producer	Category	Nutraceutical product
Erectile dysfunction treatment	Android	Revolxa inc.	Medicine	Asian ginger, Ginkgo biloba
Erectile dysfunction remedy 2021	Android	Maftal Almatary	Education	Asian ginger, Ginkgo biloba
Erectile dysfunction remedies	Android	StatesApps	Health and Fitness	Garlic, cloves, fruit nut mix, onion, drumstick, butea superba
Home remedies	Android	Cutepad studio	Medicine	Ginger, Onion, Pomegranate juice, Almonds, Garlic, Carrots
Herbal cure	Android	NovaRadix	Medicine	Byronia
101 Natural Home	Android	XL Tech Apps		Garlic

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**Correspondence**

Luigi Napolitano, MD - luiginap89@gmail.com

Luigi Cirillo, MD (Corresponding Author) - cirilloluigi22@gmail.com

Giovanni Maria Fusco, MD - giom.fusco@gmail.com

Marco Abate, MD - marcoabate5@gmail.com

Biagio Barone, MD - biagio.barone@unina.it

Vincenzo Morgera, MD - vincemorgera87@gmail.com

Gianluigi Cacace, MD - cacace.gianlu@gmail.com

Giuseppe Celentano, MD - dr.giuseppecelentano@gmail.com

Lorenzo Spirito, MD - lorenzospirito@msn.com

Vincenzo Mirone, MD - mirone@unina.it

Roberto La Rocca, MD - robertolarocca87@gmail.com

Department of Neurosciences, Reproductive Sciences and Odontostomatology, Urology Unit, University of Naples "Federico II", Naples, (Italy)

Via Sergio Pansini n 5, Naples (NA) (Italy)