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Digital Real-world Data Suggest Patient Preference for Tadalafil over Sildenafil in Patients with Erectile Dysfunction

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Abstract

Background: Erectile dysfunction (ED) is a major care problem worldwide. Tadalafil and sildenafil are the two most common phosphodiesterase-5 inhibitors (PDE5is) used to treat ED. 

Objective: This study aimed to evaluate patient data of a large online prescription platform (OPP), specifically analyzing preference for tadalafil over sildenafil.

Design, setting, and participants: Data from a prospectively collected German OPP were retrospectively analyzed. This dataset included patients with a history of taking one or both substances (n = 26 821).

Outcome measurements and statistical analysis: ED patient baseline characteristics were derived from medical questionnaires for PDE5i prescriptions between May 2019 and May 2020. Order behavior was analyzed in patients who ordered both substances over time. We applied Kruskal-Wallis tests, χ² tests, and fisher’s exact test for statistical analysis.

Results and limitations: Baseline characteristics were comparable for both PDE5is in patients with a median age of 49 yr (sildenafil [interquartile range (IQR) 38–57]; tadalafil [IQR 39–56]), a median body mass index (BMI) of 26 kg/m² (sildenafil [IQR 24.54–29.03]; tadalafil [IQR 24.49–28.69]), ED onset time of >12 mo (sildenafil [87%]; tadalafil [88%]), and the presence of morning erections (sildenafil [62%]; tadalafil [61%]). Tadalafil prescriptions increased significantly from 30% (first order) to 80% (last order) in patients who had already tested both drugs. Patients with age ≤40 yr, BMI ≤25 kg/m², and sustained morning erections preferred tadalafil to sildenafil.

Conclusions: Using database information from an OPP, preference for tadalafil was shown for patients who had tested both PDE5is. This preference was particularly pronounced in patients with age ≤40 yr, BMI ≤25 kg/m², and sustained morning erections. A well-managed OPP can be used for research on more complex health services.

Patient summary: Analysis of large online prescription platforms provide the benefit of identifying young treatment-naive patients with early-stage disease, which is highlighted by the fact that about two-thirds of our patients analyzed still maintained spontaneous morning erections. Patients who had tested tadalafil once developed preference for this drug.

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1. Introduction

Erectile dysfunction (ED) is a multidimensional and widespread sexual malfunction in men [1]. Vascular, psychological, and unknown other factors are associated with this disease [2]. Treatment includes lifestyle interventions, pharmacological treatment with phosphodiesterase-5 (PDE5) inhibitors, vacuum erection devices, injections, and surgical interventions [1]. ED is associated with metabolic and cardiovascular disease, increase in incidence rates with age, and cardiovascular disease risk factors [2].

ED can involve both physiological and psychological factors. The latter affects a more juvenile and potentially healthier patient group [3]. Sustained nocturnal erections are the leading clinical factor to discriminate psychological causes for ED [4].

A large previously unknown ED population that used an online prescription platform (OPP) to treat their disease was epidemiologically characterized [5]. Compared with the population in approval studies [6,7] and a recent review comparing sildenafil with tadalafil [8], the group from the OPP study is younger, mostly treatment naive, and not yet well characterized.

Sildenafil and tadalafil are the most common PDE5 inhibitors [8]. Sildenafil showed a treatment success rate of 84%, a quick onset within 30–120 min, and an elimination half-life of 4 h with a maximum time of action of 12 h [6,9]. The tadalafil treatment success rate was 75%, with an onset within approximately 30 min, a mean time to maximum drug concentration of 120 min, and an extended duration of action of up to 36 h [7,10].

Sildenafil and tadalafil showed similar results with regard to efficacy, tolerability, and patient satisfaction [8,11,12]. Tadalafil seemed to improve sexual confidence more effectively than sildenafil in randomized controlled trials [13–15]. Prospective studies showed a slight preference for tadalafil over sildenafil [16,17].

This study aims to investigate whether data for health services research can be obtained by a well-managed OPP database. We hypothesize tadalafil to be the preferred substance in this understudied population using an OPP for medical treatment.

2. Patients and methods

2.1. Study design

This cross-sectional study was conducted with anonymized data provided by Wellster HealthTech Group, the provider of “www.gospring.de”, an OPP for men’s health [18]. The OPP advertised on Internet search engines, digital media, and commercial spots. Patient data were collected via structured questionnaires (Supplementary Tables 1 and 2). The patient was asked for ED characteristics, PDE5 inhibitor contraindications, and possible medication interactions. Physicians also considered cardiovascular risk factors such as body mass index (BMI), nicotine, and age when deciding on a prescription.

Therapeutic options at the OPP included sildenafil (25, 50, and 100 mg) and tadalafil (5, 10, and 20 mg) by patient choice. For other treatment options or in the case of contraindications, patients were referred to urologists. After prescribing, the medication could be ordered from a cooperating online pharmacy.

Preference for one of the PDE5 inhibitors was assessed by examining repeat orders from patients who had ordered both sildenafil and tadalafil on a separate occasion (P²). Patients were excluded from this cohort if the PDE5 inhibitor switch occurred in the most recent order.

All research was carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) and its later amendments. Informed consent was received from all patients. Before initiation of the study, the local ethics authority (Ethikkommission der University of Freiburg) revised the project design and waived the need for approval (reference number: 21-1002).

2.2. Setting

OPP’s service was available only in Germany. The patient data were collected between May 2019 and May 2020. Questionnaires with at least 90% of questions answered were included. Patient data were analyzed at the prescription level, and patients had the option of ordering multiple times in a row. An automated drug abuse logic was in place, so that no more than one tablet per day could be ordered, nor several drugs at the same time.

2.3. Participants

Male patients aged ≥18 yr with self-assessed ED were eligible for prescription evaluation. Prescriptions were issued only to patients who regularly experienced ED problems [19].

2.4. Statistical analysis

Descriptive statistics were summarized as median and interquartile range (IQR). Kruskal-Wallis tests were used to examine the differences in age and BMI scores by treatment category, as values were not normally distributed, using the D’Agostino and Pearson test. Post hoc comparisons were performed using Dunn’s multiple comparison test. A Mann-Whitney U test was used to compare differences in price, as values were not normally distributed. A chi-square test was used for analysis of categorical variables, with the exception of Figures 1 and 2, and Supplementary Figure 1 for which the Fisher’s exact test was used. All p values <0.05 were regarded as statistically significant. A Bonferroni correction for multiple comparisons was used as statistically significant for Figure 2 and Supplementary Figure 1, with p <0.0125. All calculations were conducted by GraphPad Prism software version 8 (GraphPad Software, San Diego, CA, USA).

3. Results

PDE5 inhibitor prescriptions for 26,821 patients are shown in Table 1 (P¹). A total of 30,846 (85%) were sildenafil, 5,043 (14%) were tadalafil, and the remaining 516 (1%) were “Testkit” prescriptions. In addition, Table 1 shows a subset of 367 patients with 1,388 prescriptions (P²) who had a history with both sildenafil and tadalafil. There were clinically significant differences in the selected drug dosages (chi-square test, p <0.0001; Table 1). In Table 2, baseline characteristics of the sildenafil cohort were comparable with those of the tadalafil cohort with a median age of 49 yr (sildenafil [IQR 38–57]; tadalafil [IQR 39–56]), a median BMI of 26 kg/m² (sildenafil [IQR 24.54–29.03]; tadalafil [IQR 24.49–28.69]), ED onset time of >12 mo (sildenafil [87%]; tadalafil [88%]), and the presence of morning
erectile (sildenafil [62%]; tadalfal [61%]). Overall, baseline characteristics of P2 were generally comparable with those of P1 with a median BMI of 26 kg/m² (IQR 23.96–29.05), ED onset time >12 mo (88%), and presence of morning erections (64%). The P2 group differed significantly with a median age of 48 yr (comparing P1 vs P2 in respective treatment groups based on Kruskal-Wallis tests with post hoc comparisons using Dunn’s multiple comparison test; p ≤ 0.05). Additionally, there were significant differences in the consumption of nicotine (chi-square test, p = 0.0321; Table 2) and alcohol (chi-square test, p < 0.0001; Supplementary Table 3) between the groups.

For sildenafil and tadafal, higher dosages correlated with a larger pack size per prescription (Fig. 3A). The exception was tadafal 5 mg, which is used as a daily therapy. The most popular selection by patients among sildenafil and tadafal prescriptions was the pack size of 12 (Fig. 3B). Viagra, the original brand of sildenafil, was in greater demand than Cialis for tadafal (19% vs 10%; Fig. 3C). The price per pill was significantly cheaper for tadafal at €5.8 than for sildenafil at €7.6 (Mann-Whitney U test, p < 0.0001; Fig. 3D).

Prescription frequency and sequence of P1, P2, and prescriptions by patients “without change” of medication, a subgroup that had experience with only one type of PDE5 inhibitor in the platform’s order history, are shown in Figure 4. In P1, there was a significant difference in the relative prescription frequency of sildenafil versus tadafal from order sequence “one” to “eight” (chi-square test, p < 0.0001; Fig. 4A). Tadalafil prescriptions made up 12% of orders in prescription sequence “one” compared with 28% in sequence “eight”. The exception here were patients who had a history with one type of PDE5 inhibitor only, “without change” of medication. This subgroup made up the majority of prescriptions with a total number of 31,958, showing no significant difference in the relative frequency of orders (tadalafil vs sildenafil) between prescription sequences “one” and “eight” (chi-square test, p = 0.7245; Fig. 4B).

The patients’ preference for one type of PDE5 inhibitor was assessed in those who had a history with “both” sildenafil and tadafal (P2; Figs. 1, 2, and 4C). There was a significant difference in the prescription frequency of sildenafil versus tadafal from order sequence “one” to “eight” (chi-square test, p < 0.0001; Fig. 4C). The relative frequency of tadafal prescriptions increased from 30% in order sequence “one” to 80% in sequence “eight.” Accordingly, a detailed analysis revealed that there was a significant difference in the relative frequency of prescriptions (tadalafil and sildenafil) before versus after change of PDE5 inhibitor in P2 (Fishier’s exact test, p = 0.0007; Fig. 1). The proportion of tadafal prescriptions corresponded to 45% before and including the first change of PDE5 inhibitor, whereas the proportion increased to 55% after the change of medication. To better understand the drivers behind this increase, the group was divided according to age, BMI, or presence of morning erections. In contrast to patients >40 yr of age, or with BMI >25 kg/m², or without morning erections, there was a significant difference in the relative frequency of prescriptions (tadalafil and sildenafil) before versus after change of PDE5 inhibitor in patients with an age of ≤40 yr (Fishier’s exact test with Bonferroni correction, p = 0.0093; Fig. 2A), or a BMI of ≤25 kg/m² (Fishier’s exact test with Bonferroni correction, p = 0.0003; Fig. 2B), or sustained morning erections (Fishier’s exact test with Bonferroni correction, p = 0.0001; Fig. 2C). The relative frequency of tadalafil prescriptions increased from 45% before and including the first change of PDE5 inhibitor to 59% after the change of medication in patients with sustained morning erections. After change of PDE5 inhibitor, in contrast to age and BMI (Supplementary Fig. 1A and B), there was a significant difference in the relative frequency of prescriptions in patients without versus with sustained morning erections (Fishier’s exact test with Bonferroni correction, p = 0.0069; Supplementary Fig. 1C).

4. Discussion

This is the largest study conducted among men with ED using an OPP. It revealed baseline characteristics of patients using OPPs for online ED treatment. Further, patient preference for tadafal over sildenafil in a group of men who had a history with “both” PDE5 inhibitors was shown.

Baseline characteristics derived from PDE5 inhibitor prescriptions of all patients of the P1 group are comparable with those of the P2 group that had a history with both sildenafil and tadafal. The differences in patient characteristics are statistically significant due to the high number of prescriptions but are clinically irrelevant (with the exception of medication dosages). We realized that beneficiaries of digital health services are mainly treatment naive [5], are younger (29.4% of our study population is ≤40 yr, which is
Patients (P²) familiar with “both” PDE5i

A
Age >40 yr
n.s. p = 0.0154

Age ≤40 yr
* p = 0.0093

B
BMI >25 kg/m²
n.s. p = 0.1630

BMI ≤25 kg/m²
* p = 0.0003

C
Without morning erection
n.s. p = 0.3096

With morning erection
* p = 0.0001

Fig. 2 – Preference for tadalafil over sildenafil driven by ED patients under 40, not overweight, and with sustained morning erections. (A) In contrast to patients older than 40 yr, there was a significant difference in relative frequency of prescriptions (tadalafil and sildenafil) before versus after PDE5 inhibitor change in patients <40 yr old. (B) In contrast to patients with BMI >25, there was a significant difference in relative frequency of prescriptions (tadalafil and sildenafil) before versus after PDE5 inhibitor change in patients with BMI ≤25. (C) In contrast to patients without morning erections, there was a significant difference in relative frequency of prescriptions (tadalafil and sildenafil) before versus after PDE5 inhibitor change in patients with sustained morning erections. *p < 0.0125 (two tailed) from several pairwise comparisons using Fisher's exact test with Bonferroni correction for multiple comparisons. BMI = body mass index; ED = erectile dysfunction; n.s. = not significant; PDE5 = phosphodiesterase-5; PDE5i = PDE5 inhibitor.

comparable with the previous literature [20], and show an earlier stage of illness, with 61–62% of patients having sustained morning erections compared with the populations described in related ED studies.

In contrast, the approval study populations were clinically tied to university hospitals, older, and at a more severe stage of ED. The sildenafil approval study included 816 patients with a mean age of 59 yr, and the percentage of psychogenic ED was 11% and that of mixed cause was 18% [6]. Approval studies of tadalafil included 1112 patients with an average age of 59 yr, and an overall percentage of psychogenic ED of 9% and that of a mixed cause of 31% [7].

### Table 1 – PDE5 inhibitor prescriptions

<table>
<thead>
<tr>
<th>Patients Prescriptions</th>
<th>All: P1; n = 36405</th>
<th>Familiar with “both” PDESi: P2; n = 1388</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDE5 inhibitor Parameter</td>
<td>Sildenafil n (%)</td>
<td>Tadalafil n (%)</td>
</tr>
<tr>
<td># Total</td>
<td>30 846</td>
<td>5043</td>
</tr>
<tr>
<td>25 mg</td>
<td>1991 (6.5)</td>
<td>16 (2.3)</td>
</tr>
<tr>
<td>50 mg</td>
<td>23 428 (76.0)</td>
<td>516 (37.6)</td>
</tr>
<tr>
<td>100 mg</td>
<td>5427 (17.6)</td>
<td>156 (22.7)</td>
</tr>
<tr>
<td>5 mg</td>
<td>481 (9.5)</td>
<td>42 (6.3)</td>
</tr>
<tr>
<td>10 mg</td>
<td>2245 (44.5)</td>
<td>233 (35.1)</td>
</tr>
<tr>
<td>20 mg</td>
<td>2317 (45.9)</td>
<td>388 (58.5)</td>
</tr>
<tr>
<td># Testkits a</td>
<td>516</td>
<td>37</td>
</tr>
</tbody>
</table>

PDE5 = phosphodiesterase-5; PDESi = PDE5 inhibitors. Chi-square tests were used for statistical analysis of categorical data (p < 0.05).

a Definition: “Testkit” prescription is an order including both sildenafil 50 mg and tadalafil 10 mg, with a pack size of four each.

### Table 2 – Patient characteristics derived from PDE5 inhibitor prescriptions

<table>
<thead>
<tr>
<th>Patients Prescriptions</th>
<th>All: P1; n = 36405</th>
<th>Familiar with “both” PDESi: P2; n = 1388</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDE5 inhibitor Parameter</td>
<td>Sildenafil n (%)</td>
<td>Tadalafil n (%)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mdn</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>IQR</td>
<td>38–57</td>
<td>39–56</td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mdn</td>
<td>26.31</td>
<td>26.12 b</td>
</tr>
<tr>
<td>IQR</td>
<td>24.54–29.03</td>
<td>24.49–28.69</td>
</tr>
<tr>
<td>&lt;18.5 kg/m²</td>
<td>45 (0.1)</td>
<td>5 (0.1)</td>
</tr>
<tr>
<td>18.5–&lt;25 kg/m²</td>
<td>9938 (32.7)</td>
<td>1661 (34.6)</td>
</tr>
<tr>
<td>&lt;25–&lt;30 kg/m²</td>
<td>14 782 (48.7)</td>
<td>2335 (48.7)</td>
</tr>
<tr>
<td>&gt;30 kg/m²</td>
<td>5615 (18.5)</td>
<td>795 (16.6)</td>
</tr>
<tr>
<td>ED characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;12 mo</td>
<td>26 854 (87.3)</td>
<td>4459 (88.4)</td>
</tr>
<tr>
<td>&lt;1 pack/d and &lt;5 yr</td>
<td>19 186 (62.4)</td>
<td>3061 (60.7)</td>
</tr>
<tr>
<td>Smoking a</td>
<td></td>
<td></td>
</tr>
<tr>
<td># Total</td>
<td>4854</td>
<td>1162</td>
</tr>
<tr>
<td>None</td>
<td>3048 (62.8)</td>
<td>782 (67.3)</td>
</tr>
<tr>
<td>Irregular</td>
<td>693 (14.3)</td>
<td>166 (14.3)</td>
</tr>
<tr>
<td>Regular with &lt;1 pack/d and &lt;5 yr</td>
<td>311 (6.4)</td>
<td>58 (5.0)</td>
</tr>
<tr>
<td>Regular with &lt;1 pack/d and 5–10 yr</td>
<td>334 (6.9)</td>
<td>69 (5.9)</td>
</tr>
<tr>
<td>Regular with &gt;1 pack/d or &gt;10 yr</td>
<td>486 (9.5)</td>
<td>87 (7.5)</td>
</tr>
</tbody>
</table>

BMI = body mass index; ED = erectile dysfunction; IQR = interquartile range; Mdn = median; PDE5 = phosphodiesterase-5; PDESi = PDE5 inhibitors; w/ME = with sustained morning erection.

Analyzing all three groups (sildenafil, tadalafil, and both), Kruskal-Wallis tests were used to examine differences in mean age and BMI. Testkit prescriptions are not included in the analysis of age, BMI, and ED characteristics. Chi-square tests were used for statistical analysis of categorical data (p < 0.05).

a A significant difference in comparing prescriptions by all patients in respective treatment groups versus prescriptions by the patient subgroup familiar with “both” PDE5 inhibitors based on Dunn’s multiple comparison test (p < 0.05).

b A significant difference in comparing sildenafil versus tadalafil within P1 based on Dunn’s multiple comparison test (p < 0.05).

c Answer options for smoking behavior in the medical questionnaire were formulated: “I do not smoke,” “I smoke irregularly (eg, at parties), but never more than half a pack a day,” “I smoke regularly, but for <5 yr and less than one pack a day,” “I smoke regularly, for >5 but <10 yr and less than one pack a day,” and “I have been smoking regularly for >10 yr or more than one packet a day.”

Fig. 3 – Pack sizes of prescribed PDE5 inhibitors, generic versus original brand and price per pill. Analysis was based on the P1 study cohort excluding “Testkit” prescriptions. (A) The number of packs of sildenafil and tadalafil prescribed depending on the pack sizes and the different dosages. (B) The percentage distribution of the pack sizes between sildenafil and tadalafil. (C) The proportion between the generic version and the original brand was similar for sildenafil and tadalafil. (D) The price of tadalafil was €5.8 (SD: 6.7), higher than the price of sildenafil at €7.6 (SD: 5.7). The p values (two tailed) using Mann-Whitney U test were < 0.05. PDE5 = phosphodiesterase-5; PDE5i = PDE5 inhibitor; SD = standard deviation.
OMP study population had a median age of 49 yr in the treatment groups. The number of patients without prior therapy was higher than reported in previous studies (63.5%), which is likely due to the younger age and the lower contact exposure as a result of the digital treatment and home delivery of the drug [5].

The proportion of tadalafil prescriptions increased significantly, considering repeat orders over time in all patients. As patients who had a history with only one type of PDE5 inhibitor, “without change” of medication, showed no significant difference in the relative frequency of orders between prescription sequences “one” and “eight”, the increasing proportion of tadalafil prescriptions in the overall population (P$^1$) was therefore due to patients who had a history of “both” PDE5 inhibitors (P$^2$).

Preference was investigated by focusing on cohort P$^2$. We were able to show a switch of orders from a 55:45 ratio (sildenafil:tadalafil) to a 45:55 ratio after the change of PDE5 inhibitor, indicating a significant preference for tadalafil over sildenafil.

Several research groups showed that ED patients with a history of taking both substances preferred tadalafil in randomized three-phase studies [16, 21, 22], for example, Dean et al’s [16] study with 12 wk of tadalafil followed by 12 wk of sildenafil or vice versa, and then concluding with 8 wk of free choice. Men with ED who initiated treatment with tadalafil, routine or PRN, adhered to their original treatment for a significantly longer time than men starting with sildenafil PRN, although efficacy and tolerability were not significantly different between treatment

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1. Definition of subgroup: only experience with one type of PDE5i in the platform’s order history, sildenafil or tadalafil.

2. Definition of subgroup: experience with “both”, sildenafil and tadalafil; first-time switch of PDE5 (sildenafil to tadalafil or tadalafil to sildenafil) was not the last order of patient; subgroup of patients with “Testkit order” only included if independent order experience with sildenafil and tadalafil.

Fig. 4 – Increasing proportion of tadalafil in represcriptions driven by ED patients familiar with “both” PDE5 inhibitors. In order to be able to map a minimum “number of prescriptions” per “prescription sequence,” only the prescription sequence up to prescription “eight” in the entire population (n = 36 405; >99.8% of data points shown), the patient subgroup “without change” (n = 31 958; >99.9% of data points shown), and the patient subgroup “both” (n = 1388; >99.7% of data points shown) are displayed on the x axis. (A) There was a significant difference in the prescription frequency of sildenafil versus tadalafil from order sequence “one” to “eight.” (B) There was no significant change in the relative frequency of tadalafil versus sildenafil prescriptions from order sequence “one” to “eight.” (C) There was a significant difference in the prescription frequency of sildenafil versus tadalafil from order sequence “one” to “eight.” Chi-square tests were used for the statistical analysis of categorical data of the sildenafil and tadalafil prescriptions (without “Testkit”) in respective groups (p < 0.05). ED = erectile dysfunction; n.s. = not significant; PDE5 = phosphodiesterase-5; PDE5i = PDE5 inhibitor.
groups. In contrast to these earlier PDE5 inhibitor preference studies, this was a setting with a free choice of substance for every purchase on the patient side in a real-life sales setting without medical aid reimbursement.

Tadalafil preference was shown with an increase of prescriptions after change of PDE5 inhibitor from 45% to 59% in the patient group with residual morning erections. One probable reason for this preference is the higher flexibility gained by the significantly longer half-life compared with that of sildenafil [6,7]. This is supported by the studies of Rubio-Aurioles et al [13], Althof et al [23], and Tsujimura et al [24], which showed that routine and PRN tadalafil demonstrated great improvements in sexual self-confidence, time concerns, and spontaneity when compared with PRN sildenafil.

We must acknowledge the limitations of this retrospective cross-sectional study without randomization. The treatment group definition is based on a patient’s self-assessment and nonstandardized questionnaire without invasive diagnostic to confirm ED. The latter is not recommended in the basic workup of ED patients in the European Association of Urology guidelines on male sexual function [1]. Some patients might have answered inaccurately sensitive questions in the questionnaire. Further, we must consider that the population might differ from the general ED population due to marketing channels used, and patient selection bias caused by the careful and systematic exclusion of patients with risk factors for potential substance side effects [5].

OPPs seem to be an important complement to the treatment options of patients. They offer facilitated access independent of regular medical office hours [5,25] and low contact burden in circumstances with high contact barriers [26]. This example shows that long-term treatment in certain indications seems to be possible safely. Using a structured questionnaire for risk factor stratification, there is potential to transfer untreated patients with potential cardiovascular risk factors to other specialties. This important bridge between offline and online medicine could increase the number of preventive medical examinations in risk groups, as almost 63.5% of the OPP customers are lacking any medical attention [5]. Therefore, OPPs might be a useful addition in treatment options for patients, and an increase of indications and services are imaginable in the future. Additionally, there is potential opportunity in conducting prospective studies using OPP data, rather than focusing solely on retrospective research.

5. Conclusions

Tadalafil and sildenafil have shown comparable efficacy for the treatment of ED. We confirmed preference for tadalafil over sildenafil, especially in young, not overweight patients with persistent morning erections. We suggest a change in the clinical substance sequence in the treatment of ED, especially if spontaneous erections still persist. With the preference for tadalafil over other PDE5 inhibitors by this group of OPP users, we were able to show which kind of data for health services research can be obtained by a well-managed OPP database. Further, we could use available data provided by an OPP for structured postclinical research.

Author contributions: Moritz von Büren had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: J. von Büren, Wülfling, Gratzke. Acquisition of data: Schröder. Analysis and interpretation of data: M. von Büren, Wiesenbüttler. Drafting of the manuscript: M. von Büren. Critical revision of the manuscript for important intellectual content: Gratzke, Stief, Rodler. Statistical analysis: Buchner, M. von Büren. Obtaining funding: None. Administrative, technical, or material support: M. von Büren. Supervision: J. von Büren, Wülfling. Other: None.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.euf.2021.04.019.

References


