Adherence behavior assessment of oral antidiabetic medication use: a study of patient decisions in long-term disease management in primary health care centers in Surabaya

Lisa Aditama¹ / Umi Athiyah² / Wahyu Utami² / Abdul Rahem²

Abstract:
Background: Adherence to medication has an important role in the long-term management of diabetes. The Indonesian Endocrinologist Association found that of the 50% of the entire population who have been diagnosed with diabetes, two-thirds are undergoing therapy and only one-third have been achieving the intended outcomes of the drug therapy. This study aimed to identify patients’ adherence behavior and the root causes of non-adherence.

Methods: This study used a non-experimental mixed-methods approach. A total of 40 patients with type 2 diabetes mellitus (T2DM), who were part of the referral program of the National Health Care Security System (BPJS Kesehatan) were recruited by purposive sampling from 17 primary health care centers in Surabaya, Indonesia.

Results: The adherence behavior assessment revealed non-adherence among 80% of the patients. The highest instances of non-adherence based on the percentage scores involved the following: patients forgot to take the medications (38.23%), patients preferred not to take the medications (20.59%) and the drug products were not available for the patient (14.71%). The factors influencing non-adherence included the complex instructions for taking medication, the absence of a reminder, the unwanted side effects of the drug, the feeling of repetition, the feeling that drugs were ineffective and the concern for the drug’s effects on the kidney.

Conclusions: The high rates of non-adherence identified in this study encourage pharmacists to implement better medication therapy management for chronic diseases. The patients’ understanding of drug therapy indications and regimens is very important in increasing the expectations of achieving effective treatment, awareness and concern for medication safety and treatment compliance.

Keywords: adherence behavior, medication therapy management, oral antidiabetics, primary health care

Introduction

The prevalence of non-communicable diseases (NCDs) has increased throughout the world. Indonesia is one of the countries with high rates of prevalence and mortality caused by NCDs. The results of the Indonesia Basic Health Research included the four types of NCDs: cardiovascular disease, cancer, respiratory disorders and type 2 diabetes mellitus (T2DM) [1]. According to the International Diabetes Federation (IDF), in 2017, Indonesia was included in the top 10 countries with the highest prevalence of diabetes among the 20–79 age group, the 6th in the world with 10.3 million people diagnosed. This figure is expected to increase to 16.7 million by 2045. The results of the IDF survey in 2017 for people older than 65 years of age did not include Indonesia in the top 10; however, Indonesia is expected to occupy the 7th spot with the diagnoses of 5.4 million people [2]. About 50% of diabetics in Indonesia remain undiagnosed; among those who have been diagnosed, only two-thirds have undergone pharmacological or non-pharmacological treatments, and only one-third have been properly controlled [3].

Since January 1, 2014, Indonesia has implemented the National Health Insurance system (JKN) for NCD services centrally, through hospitals or secondary health facilities (FKRTL), as well as health services with a
tiated referral system in accordance with their medical needs [4]. One of the flagship programs implemented to improve the quality of health for JKN participants and to facilitate access to health services for participants with chronic diseases is the Patient Referral Program (PRB). The PRB service is provided to JKN participants suffering from chronic diseases (e.g., diabetes) who are in a controlled/stable condition but still require treatment in the long term at the primary health facilities (FKTP), such as the primary health centers (puskesmas). Specialist/sub-specialist doctors assess whether the PRB patients are under stable condition, and in order to achieve this, adherence to long-term therapy is required [5].

Although adherence to medication is an important factor in diabetes management, it is often overlooked. According to Bailey (2011), a significant proportion of type 2 diabetes mellitus (T2DM) patients showed non-adherence, which contributed to less than the desired control. T2DM requires lifestyle changes and pharmaceutical therapies to reduce blood glucose, reduce cardiovascular risk, and overcome complications; however, at present, less than 50% of patients achieve glycemic targets with HbA1c <7.0% [6].

Adherence to medication classically assesses a patient’s mistakes for not following what the doctor said. Cipolle et al. reported that 70% of patients receiving treatment have drug therapy problems that need to be solved [7]. Patient adherence is the last assessment in the treatment of patients. As the patients are given insufficient treatment information, most of them do not understand the empirical and pharmacological aspects of their treatment. In order to successfully follow a series of instructions, patients must first understand them; however, practitioners often use terms that are not clear or not easily understood by patients. Sometimes, patients understand different definitions of terms, and such a difference can lead to misunderstandings, confusion, and non-adherence [7].

Gellad et al. found that there are three factors influencing patient’s compliance: health system, provider, and patient factors [8]. This study used the principle of patient-centered adherence because this is a barrier to compliance. The obstructive factors of patient’s adherence include patient demographics, such as age, gender, ethnicity, severity of illness, medication experience, and health literacy [8]. In cases of patients with chronic diseases, nearly 50% fail to comply with medical instructions. Many factors encourage non-adherence, including a lack of patient understanding of their presentation and treatment, low patient confidence in the therapeutic benefits specified and the lack of social support [9].

The pharmacy profession can plan toward the ideal individualized pharmaceutical care services, such as medication therapy management (MTM), which are separate from their dispensing task. The emergence of the philosophy and practice of pharmaceutical care worldwide has challenged pharmacists everywhere to change their old ways and embrace a new paradigm that focuses on outcomes of care rather than on products or tasks [7]. This service empowers patients to take an active role in managing their medications. MTM services encompass the assessment and evaluation of a patient’s complete medication therapy regimen and are not limited to individual medication products [10].

Despite its importance, no study has explored medication services in the PRB. This must be managed properly by health practitioners who have competence in the field of pharmacy. Many conditions affect the readiness of patients to change their behavior after receiving information from their health practitioners. These create obstacles that hamper patients from making sound decisions related to the appropriate use of medications, which can help control the disease and resolve the non-adherence problem.

Pharmacists are the last link in the chain of prescription information, which may affect the therapeutic target for patients with chronic diseases. Such information should be comprehensive and integrated with the inputs from other health professionals. However, several factors hamper the effective transmission of appropriate information, including the following: patients have many different prescribers, medications are becoming increasingly complex, patients are developing numerous comorbidities, and they are adding many non-prescription medications. As a result, patients become confused, motivating them to change their dosage regimens or stop taking their medications altogether. In practice, the patient’s adherence behavior is never evaluated until the practitioner has determined that the medication given does not provide optimal outcomes. This is the logical way to think about medications and should be the basis for building a different approach to achieving medication adherence.

Materials and methods

This study employed a non-experimental, mixed methods (explanatory sequential design) approach in which triangulation was used for collecting and analyzing quantitative and qualitative data. The combined use of quantitative and qualitative approaches provides a more comprehensive understanding of the adherence behavior phenomenon [11]. This research was carried out through two phases, starting with quantitative data collection using a questionnaire followed by structured interviews for a more in-depth understanding of the patients’ adherence behavior.
Data collection was conducted using questionnaires in order to identify patient adherence behavior; this was followed up with an assessment. Adherence is defined as the patient’s ability and willingness to carry out a therapeutic regimen that has been clinically assessed by practitioners to be appropriate, effective, and able to produce the desired outcomes without any harmful effects based on all available evidence. In this study, we developed a questionnaire to explore the adherence behavior in using medication for a chronic disease (T2DM). The adherence behavior domain was adopted from the Pharmaceutical Care Practice: The Patient Centered Approach to Medication Management Services reference [7]. The adherence behavior domains used as the research variables and the definitions of each variable are presented below and in Table 1.

<table>
<thead>
<tr>
<th>No.</th>
<th>Domain (Item of Questionnaire)</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The patient does not understand the instructions (Q. 1–4)</td>
<td>The patient does not understand how to consume or use the medications appropriately</td>
</tr>
<tr>
<td>2.</td>
<td>The patient cannot afford the product (Q. 5–8)</td>
<td>The inability of the patient to buy prescription drugs because the price of the drug product is too expensive</td>
</tr>
<tr>
<td>3.</td>
<td>The patient prefers not to take the medication (Q. 9–13)</td>
<td>The patient understands the instructions to take medicine, but prefers not to use drug therapy as instructed</td>
</tr>
<tr>
<td>4.</td>
<td>The patient forgets to take the medication (Q. 14–17)</td>
<td>The patient does not remember to take sufficient doses of the drug</td>
</tr>
<tr>
<td>5.</td>
<td>The drug product is not available for the patient (Q. 18–20)</td>
<td>Drug products are not available to the patient because of insufficient supplies</td>
</tr>
<tr>
<td>6.</td>
<td>The patient cannot swallow or self-administer the drug product appropriately (Q. 21)</td>
<td>The patient cannot swallow or self-administer drug therapy as instructed</td>
</tr>
</tbody>
</table>

There are 21 question items of adherence behavior with a yes or no answer. The scoring of adherence behavior is calculated by dividing the total scores with the total items of the answers. A “no” answer is assigned a value of 1 and a “yes” answer is given a value of 0. Mean scores of 1 and <1 are considered adherence and non-adherence, respectively.

Based on the validity test, the developed adherence behavior questionnaire had a calculated $r$ value $> r$ table of each item, and in the reliability test, this questionnaire showed reliable results with a Cronbach’s alpha value of 0.968.

The target population in this study included T2DM patients who used oral antidiabetic medications from the local primary health care centers (puskesmas) in the east and south districts of Surabaya who met the inclusion criteria. The inclusion criteria were as follows: patients must have used oral antidiabetic medications for at least 3 months and were referred back to a primary health care (GP) from ambulatory chronic care. The exclusion criteria were as follows: Patients who were unable to read and/or write and patients with multi medical conditions.

The research sample size was determined based on the Slovin formula [12] given by

$$n = \frac{N}{1 + Ne^2}$$

where $n$ = the minimum number of samples, $N$ = total population (patients referred back to the PHC on oral antidiabetic medications treatment in their district areas) and $e$ = error tolerance limit. The values of $e$ are given below.

$$n = \frac{211}{1 + 211(0.15)^2} \approx 36.7 \approx 40$$

Patients were recruited from 17 PHCs, which is undergoing treatment within 1 month of data collection until the number of samples was sufficient. The confidentiality of patient data and data collection places in this study was guaranteed by not stating each identity and processing data to conclude on certain phenomena related to adherence behavior.
Results

A total of 40 patients with T2DM in the referral program of National Health Care Security System (BPJS Kesehatan) were observed in this study. The patients were recruited through a purposive sampling from 17 PHC centers in the east and south regions of Surabaya. Patients’ demographic data and the characteristics of all patients’ diabetes treatments are shown in Table 2.

Table 2: Patients’ demographic data.

<table>
<thead>
<tr>
<th>Demographic Characteristics</th>
<th>Subjects (proportion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>32 (80.00%)</td>
</tr>
<tr>
<td>Male</td>
<td>8 (20.00%)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>40–49 years</td>
<td>1 (2.50%)</td>
</tr>
<tr>
<td>50–59 years</td>
<td>11 (27.50%)</td>
</tr>
<tr>
<td>60–69 years</td>
<td>16 (40.00%)</td>
</tr>
<tr>
<td>70–79 years</td>
<td>11 (27.50%)</td>
</tr>
<tr>
<td>&gt;80 years</td>
<td>1 (2.50%)</td>
</tr>
<tr>
<td>Educational status</td>
<td></td>
</tr>
<tr>
<td>Primary School</td>
<td>13 (32.50%)</td>
</tr>
<tr>
<td>Junior High School</td>
<td>11 (27.50%)</td>
</tr>
<tr>
<td>Senior High School</td>
<td>16 (40.00%)</td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td>6 (15.00%)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>34 (85.00%)</td>
</tr>
<tr>
<td>Duration of diabetes</td>
<td></td>
</tr>
<tr>
<td>&lt;5 years</td>
<td>13 (32.50%)</td>
</tr>
<tr>
<td>5–9 years</td>
<td>11 (27.50%)</td>
</tr>
<tr>
<td>10–19 years</td>
<td>12 (30.00%)</td>
</tr>
<tr>
<td>20–29 years</td>
<td>3 (7.50%)</td>
</tr>
<tr>
<td>&gt;30 years</td>
<td>1 (2.50%)</td>
</tr>
<tr>
<td>Metformin</td>
<td>7 (17.50%)</td>
</tr>
<tr>
<td>Gliclazide</td>
<td>1 (2.50%)</td>
</tr>
<tr>
<td>Acarbose</td>
<td>2 (5.00%)</td>
</tr>
<tr>
<td>Glimepiride</td>
<td>2 (5.00%)</td>
</tr>
<tr>
<td>Gliclazide</td>
<td>1 (2.50%)</td>
</tr>
<tr>
<td>Metformin + glimepiride</td>
<td>17 (42.50%)</td>
</tr>
<tr>
<td>Metformin + gliclazide</td>
<td>1 (2.50%)</td>
</tr>
<tr>
<td>Metformin + gliquidone</td>
<td>2 (5.00%)</td>
</tr>
<tr>
<td>Acarbose + glimepiride</td>
<td>2 (5.00%)</td>
</tr>
<tr>
<td>Metformin + gliclazide + acarbose</td>
<td>5 (12.50%)</td>
</tr>
</tbody>
</table>

Based on Figure 1, it appears that most subjects received a mono therapy and a combination of two oral antidiabetic drugs. The drug most often prescribed for mono therapy was metformin.

Figure 1: Profiles of oral antidiabetic medications taken by the patients.

Quantitative analysis

Adherence assessment was carried out using the adherence behavior questionnaire developed in this study. The following is a description of the results of the adherence assessment for each respondent (Table 3) and the proportion of adherence behavior of each domain (Table 4).
The highest non-adherence behavior (score <1) had to do with patients forgetting to take their medication, followed by patients preferring not to take the medication and the non-availability of the drug product.

Table 3: Patients’ adherence characteristics in all domains.

<table>
<thead>
<tr>
<th>Adherence characteristics</th>
<th>Subjects, n</th>
<th>Proportion, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adherence</td>
<td>8</td>
<td>20.00</td>
</tr>
<tr>
<td>Non-adherence</td>
<td>32</td>
<td>80.00</td>
</tr>
</tbody>
</table>

Table 4: Patients’ adherence behavior in each domain.

<table>
<thead>
<tr>
<th>No</th>
<th>Adherence behavior domain</th>
<th>Adherence (mean score =1)</th>
<th>Non-adherence (mean score &lt;1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Subjects (proportion)</td>
<td>Subjects (proportion)</td>
</tr>
<tr>
<td>1</td>
<td>The patient does not understand the instructions</td>
<td>31 (77.50%)</td>
<td>9 (22.50%)</td>
</tr>
<tr>
<td>2</td>
<td>The patient cannot afford the product</td>
<td>35 (87.50%)</td>
<td>5 (12.50%)</td>
</tr>
<tr>
<td>3</td>
<td>The patient prefers not to take the medication</td>
<td>26 (65.00%)</td>
<td>14 (35.00%)</td>
</tr>
<tr>
<td>4</td>
<td>The patient forgets to take the medication</td>
<td>14 (35.00%)</td>
<td>26 (65.00%)</td>
</tr>
<tr>
<td>5</td>
<td>The drug product is not available for the patient</td>
<td>30 (75.00%)</td>
<td>10 (25.00%)</td>
</tr>
<tr>
<td>6</td>
<td>The patient cannot swallow or self-administer the drug product appropriately</td>
<td>36 (90.00%)</td>
<td>4 (10.00%)</td>
</tr>
</tbody>
</table>

Qualitative analysis

Direct observations and structured interviews were conducted to identify the factors that cause the patients’ non-adherence behavior. Specifically, we assessed what drugs were used by a patient, whether a patient followed the instructions on the label and the suitability of all drugs received and used by the patient (Table 5).

Table 5: Themes of patients’ non-adherence behavior.

<table>
<thead>
<tr>
<th>Domain</th>
<th>The non-adherence behavior themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The patient does not understand the instructions</td>
<td>1. Needs help from other people to read the instruction to use</td>
</tr>
<tr>
<td></td>
<td>2. Uses one’s own instruction</td>
</tr>
<tr>
<td></td>
<td>3. Untimely takes medication</td>
</tr>
<tr>
<td>The patient cannot afford the product</td>
<td>1. Cannot access the drug product because it is not available at the</td>
</tr>
<tr>
<td></td>
<td>health center and nearest pharmacy</td>
</tr>
<tr>
<td>The patient prefers not to take the medication</td>
<td>1. Reduce the frequency of taking medication because of worries</td>
</tr>
<tr>
<td></td>
<td>2. Prefer herbal remedies</td>
</tr>
<tr>
<td></td>
<td>3. Be bored of taking medication</td>
</tr>
<tr>
<td>The patient forgets to take the medication</td>
<td>1. Do not understand the complex instructions for taking medication</td>
</tr>
<tr>
<td></td>
<td>2. Do not have a reminder</td>
</tr>
<tr>
<td></td>
<td>3. Be in a hurry</td>
</tr>
<tr>
<td>The drug product is not available for the patient</td>
<td>1. The medicine is not available, so the patient does not use</td>
</tr>
<tr>
<td></td>
<td>prescription drugs</td>
</tr>
<tr>
<td></td>
<td>2. The amount of medicine given is less than it should be</td>
</tr>
<tr>
<td></td>
<td>3. Patients have leftover medication due to non-adherence</td>
</tr>
<tr>
<td>The patient cannot swallow or self-administer the drug product appropriately</td>
<td>It is difficult to swallow the medicine</td>
</tr>
</tbody>
</table>
Results of the structured interviews

The interview results on the highest non-compliance domains are displayed in quotes below.

The domain of patients forget to take the medication

The theme of the patient forgetting to take the medication showed that the patients’ non-adherence may be unintentional.

Theme 1: The complex instructions for taking medication
In this theme, the patients stated that the main reasons for forgetting to take medication was due to the fact that more than one medication was prescribed and different instructions for use were given:

“…yes, I’ve forgotten. I often confuse the morning medicine with the afternoon medicine and vice versa.” (Subject 7)

“Yes, I’ve forgotten, hehehe...often confused with one another.” (Subject 31)

Theme 2: Nobody reminds the patients
This can be considered a lack of support on the part of the patients’ relatives who believed that, because the patients were taking medicine for personal use, they need not be warned:

“Yes, if I take medication, I will drink it myself, never be reminded.” (Subject 2)

“Nobody reminded. Yes, I do not ask to be reminded.” (Subject 27)

Theme 3: The patients’ busy schedules
Having a busy schedule was a classic reason for non-adherence. If patients were in a hurry, taking medicine becomes their least priority:

“I forget... for example, after eating... I forgot not to take my medication before. Sometimes, I tried to remember whether I had taken medication or not. When in doubt, I don’t take medication. If there are many activities and a lot of thoughts, sometimes I forget... whether I have taken a small tablet, which must be taken before eating or not (glimepiride).” (Subject 14)

The domain of patients preferring not to take the medication

In this domain, patients showed non-adherence for various reasons.

Theme 1: Reduced frequency of taking medication because of worries
Themes were grouped based on the criteria of reducing the frequency of taking medicine without consulting a doctor. Such a reduction can affect the efficacy of the medications prescribed:

“Sometimes, there are thoughts of fear of the effects on other organs and I reduce the dose a little. Metformin should be taken 3 times, but I take it only 2×, sometimes 1×. If the blood sugar level is good, I’ll reduce the amount of the medicine again.” (Subject 7)

Theme 2: Patients preference for herbal remedies
In this theme, patients reduced the frequency of prescribed drug use and added alternative herbal medicines because they believed that herbal medicines were safer and more effective when added:

“My condition still doesn’t change... yeah...like there is no effect from the medicine I take...but I still take them. So, I add the consumption of ginger, turmeric, moringa leaves, some said that moringa leaves are great for diabetes, so I consume it. But...yeahh...the medicine from the doctor I use it if I remember hehehe...” (Subject 5)

Theme 3: Patients being bored of taking medication
In this theme, the majority of patients reported that they were “bored” because they had to take medication regularly; thus, the patients often decide on their own to reduce the frequency without consulting a health practitioner:

“Sometimes, I used metformin only in the afternoon (from the 3 times daily instruction) instead of forgetting...but when I see the medicine, I am sick of it, so I just reduce using it. But I never told the doctor because of fear that I would be scolded, hehehe...usually it was. The doctor said... wooo... you become a doctor yourself, why bother coming to me again. Because of the stories from friends, I decided not to tell my doctor that I don’t take my medicine as intended. The important thing for him is that every time I see him, my blood sugar level is never above 200.” (Subject 12)
The domain of drug products not being available for the patient

The non-availability of the prescribed drugs when dispensed to the patients could be a cause of non-adherence arising from the health care system.

**Theme 1: The medicine is not available so the patients do not use the prescribed drugs**

If the drug products were not available at the PHC, the patients were reluctant to get them back or to look for other referral pharmacies:

“Sometimes, there is no quidone in the pharmacy (gliquidone), yeah... I used only metformin from my husband’s. I don’t care, the important thing is still taking the medicine that is available. Yeah... but finally I don’t want to be referred back to the PHC again. I don’t bother to try.” (Subject 3)

“Yes... the drug named gliquidone is not ready at Puskesmas, it is also not available at the pharmacy. So, sometimes I just used metformin only.” (Subject 17)

**Theme 2: The amount of medicine given is less than it should be**

Sometimes, the amount of medicine given was less than it should be, so the patient must return another day or look for a referral pharmacy. Patients often decide to buy medicines on their own:

“Sometimes, the amount of medicine is lacking but my child buys it at the pharmacy.” (Subject 2)

“Yes, I was given gliclazide for just 3 days. For the next, I bought it myself.” (Subject 20)

**Theme 3: Patients have leftover medication due to non-adherence**

Even though the amount of medication received was sometimes less than it should be, some patients still reported having medication leftover from the previous month – a sure sign of non-adherence:

“Sometimes, if you go to Puskesmas, you’ll get the medicine the day after. But I still have a lot of medicine left at home” (Subject 12)

“Sometimes, the medicine is only given for 15 days... this is medicine from the hospital and from the Puskesmas (shown). I often do not return to take the medicine, because there are always many medicines at home. I go to the hospital every three months and once a month to Puskesmas, but there are still many leftover medicines. The medicine is always available, so I share it to people who are diabetic. If they ask, I give it.” (Subject 5)

**Discussion**

The majority of patients in this study were of productive age, unemployed, with secondary school educational level, and on oral antidiabetic medications; 80% reported non-adherence with the medication given. The most prevalent non-adherence behavior had to do with patients forgetting to take the medication, followed by other non-adherence behaviors, such as patients preferring not to take the medication and the non-availability of the drug product.

The domain of patients forgetting to take medication frequently reflects what patients want in terms of concerns about the medications or how they must be taken. Common concerns included risks of taking certain medication, confusion over how to take a medication, and lack of support from the patients’ relatives to remind them to take medication. These unintentional cases of non-adherence are a passive process whereby patients fail to adhere to prescribing instructions through forgetfulness, carelessness or circumstances beyond their control (e.g. health literacy) [13]. Pharmacist may initiate a review of patients’ understanding of their medications and their preferences to identify the patients’ drug-related needs.

Non-adherence occurs because patients consider it unnecessary or because of their fears and beliefs related to the side effects of the drugs prescribed to them. Therefore, it is important to provide clear information about the drugs being prescribed to the patients [14]. Furthermore, patients who feel that their concerns are not being attended to by the practitioner often do not take medications as intended.

The domain of patients preferring not to take the medication indicates that it is most frequently caused by metformin dosing interval associated with the lack of effectiveness. This was observed in patients who received a dosage regimen that was not sufficient to produce the desired pharmacological result. A dosage regimen has multiple parts: the drug product, the dose, the dosing interval, and the duration of therapy [13]. Ensuring that the patients are taking an adequate dosage of their medications to produce the desired effects is the responsibility of the practitioners. In fact, drug therapy problems caused by dosage regimens that are too low are the second most frequently encountered problems in pharmaceutical care practice.
The domain of patients preferring not to take the medication represents intentional non-adherence for various reasons. The majority of the patients were worried about using the medication regularly. Patients’ concerns vary. Some were worried about unintended effects, their organs being damaged or feeling that the medication prescribed by doctors were not suitable. Despite the negative effects felt by the patients, it was not possible to know for sure whether they came from the kind of medication consumption or from the patients’ own perceptions about the medications.

Concerns related to medications are a major cause of non-adherence. Past experiences with medications have a significant impact on a patient’s willingness to take them in the future. Such concerns are frequently the reasons cited why they want to see a pharmaceutical care practitioner [7].

When patients choose not to take a medication as intended, they have what they consider to be a good reason for not accepting advice and not complying with their prescription instructions. Practitioners must internalize the fact that patients’ perceptions and health care belief systems, which we discovered during the assessment process, are a major driving force that ultimately influences their decision on whether to seek proper care and whether they should follow instructions and professional advice [7]. Information is the key to what, why, when, how and how long patients follow up on their health problems. The use of this information is classified as an individual’s ability to understand the meaning of health information [15], [16].

Strategies like motivational interviewing have been used across practice settings, especially by practitioners with the intent to increase patients’ adherence to behavior changes. In order to ensure its effectiveness in patient-centered medication management, the practitioner should acknowledge and attend to a patient’s medication experience and, in turn, use it to guide or tailor patient education and counseling on medications so to prevent or resolve drug therapy problems [17].

Medication adherence is an important part of improving clinical outcomes for patients with diabetes. Barriers to medication adherence are complex and individualized, reflecting the fact that each patient manages his/her medications in the context of his/her own life [18].

The domain of the non-availability of drug products shows the lack of access to medication. In the Indonesian Standard of Pharmacy Services in Health Centers (2016), pharmacists are responsible for managing pharmaceutical supplies and clinical pharmacy services [19]. To provide patient-centered services, meeting access to medications is the main thing. Delays in dispensing medication for patients can lead to drug-related problems, one of which is patient adherence. In the current study, adherence was poor among users of traditional pharmaceutical supplies and clinical pharmacy services [19].

In the time-limited medical appointment, there may not be enough time to fully explore the challenges to adherence. In terms of future directions, the use of technology to support adherence is an important route for exploration. Evidence has been presented to support the notion that the use of telephone/text-based reminders for appointments improve attendance; thus, text-based reminders for adherence to diabetes regimens are also being explored [21].

The preliminary evidence of this study shows that adherence assessment is an essential pharmacist service, which is part of their responsibility to achieve the definite outcomes aligned with the objectives of pharmaceutical care practices. Accurately identifying patient-specific reasons for non-adherence and effectively implementing appropriate adherence support strategies have been reported to improve patients’ adherence and resulted in patients expressing less concerns and having a stronger belief in the necessity of their medicines [22]. In addition, adherence to a medication regimen is a test of the practitioner’s ability to practice in a patient-centered manner. Patient-centered adherence can be achieved when the practitioner considers a patient’s individual needs, his/her rights and responsibilities, and the practitioner’s obligation to make decisions for each individual patient in a consistent, systematic and comprehensive manner [7]. The first limitation of this study, however, is that only clinical observations have been carried out; no interventions have been implemented. Further research must carry out the comprehensive management of drug therapy to achieve definite outcomes from the long-term treatment of diabetes.

When a patient’s care setting changes, to facilitate continued MTM services, the pharmacist transitions the patient to another pharmacist in the patient’s new care setting. In these situations, the initial pharmacist providing MTM services participates cooperatively with the patient’s new pharmacist provider to facilitate the coordinated transition, including the transfer of relevant medication and other health-related information. A follow-up MTM visit is scheduled based on the patient’s medication-related needs, or the patient is transitioned from one care setting to another. This adherence assessment tool might be used as a follow up instrument of MTM to determine a patient’s adherence and re-assess the case as needed.
Conclusions

The problem of non-adherence in this study encourages pharmacists to actively participate in the patient care process. The patient’s understanding of drug therapy indications and regimens is very important in encouraging a patient’s expectations of achieving effective treatment. Information about the safety of treatment will reduce the patient’s concern in using the medication as intended. Adherence to medication represents a willingness and an action, which will arise from the patient if all these things are met.

The practice of pharmaceutical care not only provides us with the opportunity to improve adherence, but also imposes a responsibility for us to approach it from a different perspective than what has been considered. This approach is very different. In fact, the traditional meaning of adherence does not really “fit” the paradigm of the practice. Therefore, we will refer to this new adherence assessment tool as “patient-centered adherence.”

Acknowledgments

The authors would like to thank The Ministry of Research, Technology and Higher Education of Indonesia for providing grants for the implementation of this research. The authors are also grateful for the support of the heads of the Surabaya City Health Office who have given us permission to carry out this research.

Research funding: A doctoral dissertation grant from The Ministry of Research, Technology and Higher Education of Indonesia.

Author contributions: All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

Competing interests: The authors declare no conflicts of interest or financial interests in any product or service mentioned in this article, including grants, gifts, or honoraria.

Informed consent: Informed consent was obtained from all individuals included in this study.

Ethical approval: This research has obtained permission from the Surabaya City Health Office with a permit number for research: 072/20362/436.7.2/2018.

Appendix

The Adherence Behavior Questionnaire.

<table>
<thead>
<tr>
<th>No</th>
<th>Adherence behavior</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I need help from other people every time I read the instructions for use of my medicine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The information written on the label is unclear, I use my own rules</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>I don’t always use my medicine on time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I am not sure how to use my medicine correctly (*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I don’t redeem medicine that are prescribed to be purchased at other pharmacies (if you have never experienced them, no need to answer)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>I replace my medicine with another drugs (herbs or alternative therapies)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>I save on the use of my medicine so that it is enough to use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>I only take my medicine when I feel my blood sugar level is high/rising</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>When I feel dizzy, weak or unhealthy, I decide not to use my medicine without checking my blood sugar level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I feel that my medicine caused a negative change to me, so I don’t use it</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>I feel my condition does not improve with medication, so I stop it</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>I am worried that my medicine will affect the kidneys, so I don’t use it regularly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>I often feel uncomfortable when using my medicine, so I don’t use it regularly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>I sometimes forget to use my medicine, because I get more than 1 drug with different instructions for use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>I sometimes forget to use my medicine, because my activities are crowded</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>I sometimes forget to use my medicine, because nobody reminds me</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
17 I sometimes forget to use my medicine because I fall asleep
18 Prescription medicine are not available at the Primary Health Center, so I don’t
use the medicine
19 Sometimes the medicine at the Primary Health Center is lacking, I don’t go back
to the Primary Health Center to get the rest of my medicine
20 When my medicine is running out, I don’t buy my medicine myself at the
pharmacy
21 I have difficulty using medicine, because I cannot swallow or use the medicine

(*) If you have a special drug, show how to use it after filling out the questionnaire.

References

Jakarta: PB. PERKENI, 2015.
Practice, 2011.
[10] The American Pharmacists Association and the National Association of Chain Drug Stores Foundation. Medication Therapy manage-
sure of an individual’s capacity to seek, understand and use health information within the healthcare setting. Patient Educ Couns 2013;91:228–35.
[18] Brundisini F, DeJean D, Giacomini M, Hulan D, Vanstone M. Patient experiences of medication adherence: a systematic review and quali-
[19] Indonesian Ministry of Health. Minister of Health Regulation No. 75 about the Primary Health Center (Puskesmas), 2014.
[22] Nguyen T-M, La Caze A, Cottrell N. Validated adherence scales used in a measurement-guided medication management approach to
target and tailor a medication adherence intervention: a randomized controlled trial. BMJ Open 2016;6:e013375.
CONFERENCE SPECIAL ISSUE
2ND INTERNATIONAL GRADUATE STUDENT CONFERENCE ON
PHARMACEUTICAL SCIENCES (IGSCPS) & 2019 INTERNATIONAL
JOINT SYMPOSIUM OF THE 8TH ASIA PACIFIC PHARMACY
EDUCATION NETWORK AND THE 2ND HALAL PHARMACEUTICALS
AND COSMETICS (APPEN-HPC)

GUEST EDITORS
Elida Zairina
Chrismawan Ardianto

EDITOR-IN-CHIEF
Michal Horowitz
Journal of Basic and Clinical Physiology and Pharmacology

ISSN: 2191-0286
Editor-in-chief: Ugo Oliviero
Managing Editor: Alberto Marra

Editorial

Editor-in-Chief:
Ugo Oliviero (Federico II University, Naples, Italy)

Deputy Editor:
Alberto M. Marra (Federico II University, Naples, Italy and University of Heidelberg, Germany)

Associate/Section Editors:

Emergency Medicine: Giorgio Bosso (S. Maria delle Grazie Hospital, Pozzuoli, Naples)

Oncology: Evelyne Bischof (prev.Ewelina Biskup; University Hospital Basel, Switzerland, Shanghai University of Medicine & Health Sciences, Shanghai, China)

Hematology and Coagulation disorders: Pablo Demelo-Rodriguez (G. Marangon Hospital and Universidad Complutense de Madrid, Spain)

Vascular Medicine: Antonio Valvano (Legnano Hospital, Legnano, Italy)

Gastroenterology: Theodor Voiosu (University of Bucharest, Bucharest, Romenia)

Liver Disease: Andrei Voiosu (University of Bucharest, Bucharest, Romenia)

Neurology and Cerebrovascular: Lorenzo Falsetti (Azienda Ospedaliero-Universitaria "Ospedali Riuniti" di Ancona, Italy)

Gender Medicine: Valeria Raparelli (University of Ferrara, Ferrara, Italy)

Endocrinology: Ieva Ruza, (University of Riga, Riga, Latvia)

Diabetology and Metabolism: Mariarosaria De Luca (Federico II University, Naples)

Cardiovascular Diseases: Andrea Salzano (Glenfield General Hospital, University of Leicester, Leicester, UK)

Heart Failure: Antonio Cittadini (Federico II University of Naples, Naples, Italy)

Respiratory Medicine: Salvatore Torrisi (University of Catania, Catania, Italy)
Geriatrics: Leonardo Bencivenga (Federico II University, Naples, Italy)

Immunology: Gilda Varricchi (Federico II University, Naples, Italy)

Rheumatology: Domenico Sambataro (Artroreuma, Catania, Italy)

Basic Science: Francesca Vinchi (New York Blood Center, New York, USA), Roberta D’Assante (Federico II, Naples), Felice Crocetto (Federico II University, Naples, Italy)

Urology, Andrology and Nephrology: Felice Crocetto (Federico II University, Naples, Italy)

Editorial Office:
E-mail: jbcpp.editorial@degruyter.com

(Deutsch)

If you have institutional access, your institution may have a subscription to this journal. Authenticate with your institution to access content.

—or—

Subscription

| Type       | Electronic Individual | 99,00 € | Electronic Institution | 641,00 € |

To subscribe

Contact our sales team

Online ISSN: 2191-0286

Type: Journal

Language: English

Publisher: De Gruyter

First published: December 1, 1986

Publication Frequency: 6 Issues per Year

Audience: researchers and health professionals in the field of clinical physiology and pharmacology
Published by De Gruyter

Volume 30 Issue 6 - Conference Special Issue: 2nd International Graduate Student Conference on Pharmaceutical Sciences (IGSCPS) & 2019 International Joint Symposium of the 8th Asia Pacific Pharmacy Education Network and the 2nd Halal Pharmaceuticals and Cosmetics (APPEN-HPC) / Guest Editors: Elida Zairina & Chrismawan Ardianto

November 2019

Issue of Journal of Basic and Clinical Physiology and Pharmacology

CONTENTS

JOURNAL OVERVIEW

Reviews

Requires Authentication  January 23, 2020
Pharmacist contributions in the treatment of diabetes mellitus in Southeast Asia: a narrative review
Ayu Wulan Dwiputri, Liza Pristianty, Andi Hermansyah
Article number: 20190322

Requires Authentication  December 20, 2019
The implementation of a chronic disease management program (Prolanis) in Indonesia: a literature review
Sesty Rachmawati, Hanni Prihastuti-Puspitasari, Elida Zairina
Article number: 20190350

Original Articles

Requires Authentication  November 28, 2019
Quercetin attenuates acute predator stress exposure-evoked innate fear and behavioral perturbation
Putri Anggreini, Chrismawan Ardianto, Mahardian Rahmadi, Junaidi Khotib
Article number: 20190242

Evaluating current practices and policies in the use of injectable medicines for treating myalgia in a primary care center in Pamekasan, Indonesia
Eko Prasetio, Wahyu Utami, Zulhabri Othman, Ari Wardani, Abdul Rahem, Andi Hermansyah
Article number: 20190328

The contemporary role and potential of pharmacist contribution for community health using social media
Andi Hermansyah, Anila Impian Sukorini, Fadli Asmani, Kandi Aryani Suwito, Titik Puji Rahayu
Article number: 20190329

Evaluation of rational drug use based on World Health Organization prescribing indicators in a primary care center in Pamekasan East Java, Indonesia
Eko Prasetio, Wahyu Utami, Zulhabri Othman, Ari Wardani, Abdul Rahem, Andi Hermansyah
Article number: 20190326

The prescription patterns of second-generation antipsychotics in schizophrenia outpatient setting
Julaeha Julaeha, Umi Athiyah, Andi Hermansyah
Article number: 20190289

Factors affecting community pharmacist's service for women with chronic diseases during pregnancy and breastfeeding: application of the Health Belief Model
Septi Anggraini, Wahyu Utami, Elida Zairina
Article number: 20190347

Overview of therapeutic changes in antiepileptic drugs in adult patients
Dinda M.N. Ratri, Mahardian Rahmadi, Wardah R. Islamiyah, Nur Faridah Harum
Article number: 20190346
Exploration of barriers affecting job satisfaction among community pharmacists
Muhammad Khalid Rijaluddin, Wahyu Utami, Zulhabri Othman, Hanni Prihastuti Puspitasari, Abdul Rahem, Anila Impian Sukorini, Andi Hermansyah
Article number: 20190325

Patients' characteristics and their adherence to insulin therapy
Yunti Fitriani, Liza Pristianty, Andi Hermansyah
Article number: 20190330

Correlation of chemotherapy costs with quality of life in nasopharyngeal cancer patients
Achmad Chusnu Romdhoni, Riskha Aulia, Ririn Prasetyo Utamingtyas, Suharjono, Christopher Paul Alderman
Article number: 20190238

Impact of educational preeclampsia prevention booklet on knowledge and adherence to low dose aspirin among pregnant women with high risk for preeclampsia
Rella Indah Karunia, Anita Purnamayanti, Fransiscus O.H. Prasetyadi
Article number: 20190299

Translation, cultural adaptation, and validation of the quality of well being self-administered questionnaire in general population in Indonesia
Tri Murti Andayani, Susi Ari Kristina, Dwi Endarti
Article number: 20190268

Knowledge, attitude, and practice of pharmacists towards management of hypertension in primary care centers
I Nyoman Wijaya, Umi Athiyah, Fasich, Andi Hermansyah
Article number: 20190319
Medication adherence in diabetes mellitus patients at Tanjung Karang Primary Health Care Center, Mataram
Mahacita Andanalusia, Umi Athiyah, Yunita Nita
Article number: 20190287

Decreasing angiogenesis vasa vasorum through Lp-PLA₂ and H₂O₂ inhibition by PSP from Ganoderma lucidum in atherosclerosis: in vivo diabetes mellitus type 2
Titin Andri Wihastuti, Reyhan Amiruddin, Fibe Yulinda Cesa, Amalia Istiqamah Alkaf, Meddy Setiawan, Teuku Heriansyah
Article number: 20190349

Antiaggregation effect of clopidogrel in coronary heart disease patients using omeprazole
Dian Hasiannami Boru Munthe, Siti Sjamsiah Sargo, Mohammad Yogiarto
Article number: 20190266

The effect of curcuma (Curcuma xanthorrhiza roxb.) extract as an adjuvant of captopril therapy on cardiac histopathology of male mice (Mus musculus) with hypertension
Nursela Hijriani, Lilik Yusetyani, Didik Hasmono
Article number: 20190280

Coenzyme Q10 nanostructured lipid carriers as an inducer of the skin fibroblast cell and its irritability test in a mice model
Fenita Shoviantari, Tristiana Erawati, Widji Soeratri
Article number: 20190320

Medical problems in patients with chronic kidney disease undergoing hemodialysis and their therapy
Budi Suprapti, Wenny Putri Nilamsari, Rachmania, Widodo, Chris Alderman
Article number: 20190250

ADMET properties of novel 5-O-benzoylpinostrobin derivatives
Mohammad Rizki Fadhil Pratama, Hadi Poerwono, Siswando Siswodiharjo
Article number: 20190251
Development of nonalcoholic fatty liver disease model by high-fat diet in rats
Hijrawati Ayu Wardani, Mahardian Rahmadi, Chrismawan Ardianto, Santhra Segaran Balan, Norshafarina Shari Kamaruddin, Junaidi Khotib
Article number: 20190258

Molecular docking of novel 5-O-benzoylpinostrobin derivatives as wild type and L858R/T790M/V948R mutant EGFR inhibitor
Mohammad Rizki Fadhil Pratama, Hadi Poerwono, Siswando Siswodihardjo
Article number: 20190301

The relationship between the level of education and accuracy of insulin injection techniques in DM patients with measurement of HbA$_{1c}$ values
Anisyah Achmad, Fatchur Rohmi Latifatus Sholihah, Wanda Fenny Oktavianti, Laksni Sasiarini
Article number: 20190303

The effect of premixed insulin to blood glucose concentration in patients with type 2 diabetes mellitus
Arina D. Puspitasari, Hayu Kusuma, Dinda M.N. Ratri, Cahyo Wibisono, Budi Suprapti
Article number: 20190342

Intravenous insulin therapy in diabetes mellitus with hyperglycemic crisis and intercurrent illness
Budi Suprapti, Fairuz Syarfina, Chrismawan Ardianto, Cahyo Wibisono
Article number: 20190337

Adherence behavior assessment of oral antidiabetic medication use: a study of patient decisions in long-term disease management in primary health care centers in Surabaya
Lisa Aditama, Umi Athiyah, Wahyu Utami, Abdul Rahem
Article number: 20190257
Evaluation to the chemotherapy use in patients with diffuse large B-cell lymphoma

Dirani Dirani, Suharjono, Made Sedana, Siti Wahyuni, Chrismawan Ardianto, Chris Alderman

Article number: 20190336

Analysis of the use and cost of stress ulcer prophylaxis for surgical inpatients

Dhani Wijaya, Elfrí Padolo, Chrismawan Ardianto, Sumarno, Fendy Matulatan, Chris Alderman, Suharjono

Article number: 20190306

Antineuroinflammation activity of n-butanol fraction of Marsilea crenata Presl. in microglia HMC3 cell line

Burhan Ma’arif, Denis Mery Mirza, Mu’akibatul Hasanah, Hening Laswati, Mangestuti Agil

Article number: 20190255

The enhancement of Arg1 and activated ERβ expression in microglia HMC3 by induction of 96% ethanol extract of Marsilea crenata Presl. leaves

Burhan Ma’arif, Mangestuti Agil, Hening Laswati

Article number: 20190284

Ternary solid dispersion to improve solubility and dissolution of meloxicam

Dwi Setyawan, Meivita Yusmala Dewi, Dewi Isadiartuti

Article number: 20190244

Improving solubility and dissolution of meloxicam by solid dispersion using hydroxypropyl methylcellulose 2910 3 cps and nicotinamide

Ana Fathanah, Dwi Setyawan, Retno Sari

Article number: 20190249

o-Hydroxycinnamic derivatives as prospective anti-platelet candidates: in silico pharmacokinetic screening and evaluation of their binding sites on COX-1 and P2Y12 receptors

Kholis Amalia Nofianti, Juni Ekowati

Article number: 20190327
The change of proinflammatory cytokine tumor necrosis factor α level in the use of meloxicam in rat model of osteoarthritis
Junaidi Khotib, Naning Windi Utami, Maria Apriliani Gani, Chrismawan Ardianto
Article number: 20190331

Attenuation of IL-1ß on the use of glucosamine as an adjuvant in meloxicam treatment in rat models with osteoarthritis
Junaidi Khotib, Asri Putri Pratiwi, Chrismawan Ardianto, Mahardian Rahmadi
Article number: 20190332

Analysis of effectiveness and drug related problems of pain reliever for knee osteoarthritis: weighing clinical risk and benefit
Junaidi Khotib, Henny Utami Setiawan, Ahmad Dzulfikri Nurhan, Erreza Rahadiansyah, Chrismawan Ardianto, Mahardian Rahmadi
Article number: 20190338

Comparison of antibiotic prescriptions in adults and children with upper respiratory tract infections in Bangka Tengah primary health care centers
Pratama Novan Y. I., Avianto Primadi, Mahfudz, Suharjono
Article number: 20190248

Profile of sociodemographics, sources of infection, antiretrovirals and CD4 counts on HIV/AIDS outpatients in Turen Primary Health Centre, Indonesia
Ellyvina S. Dhini, Antonius Adjí P. Setiadi, Yosi I. Wibowo
Article number: 20190259

Synergistic anti-hepatitis C virus activity of Ruta angustifolia extract with NS3 protein inhibitor
Tutik Sri Wahyuni, Humairoh Mahfud, Adita Ayu Permatasari, Aty Widyawaruyanti, Achmad Fuad
Article number: 20190348
In vitro equivalence of generic and branded amoxicillin tablet by microbiological assay method
Primadi Avianto, Mahfudz, Suharjono, Isnaeni, Christopher Paul Alderman
Article number: 20190247

Knowledge and attitude: two fundamental factors that determine patient compliance in antibiotic therapy
Liza Pristianty, Vivi Laily Kurniati, Ika Ratna Hidayati
Article number: 20190321

Molecular docking study of sappan wood extract to inhibit PBP2A enzyme on methicillin-resistant Staphylococcus aureus (MRSA)
Marisca Evalina Gondokesumo, Ihsan Mulyadi Kurniawan
Article number: 20190282

Effect of curcumin analogue synthetic product from cullilawan oil for the liver damage treatment in male mice (Mus musculus L.)
Imanuel Berly Delvis Kapelle, Wasmen Manalu, Fensia Analda Souhoka
Article number: 20190241

Case Report

A case report of generalized tetanus in a 42-year-old man with dental infection
Maria Ulfa, Nuril Auliya Husna
Article number: 20190243
**Journal of Basic and Clinical Physiology and Pharmacology**

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>SUBJECT AREA AND CATEGORY</th>
<th>PUBLISHER</th>
<th>H-INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>Biochemistry, Genetics and Molecular Biology, Physiology</td>
<td>Walter de Gruyter GmbH</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Medicine, Medicine (miscellaneous)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pharmacology, Toxicology and Pharmaceutics, Drug Discovery, Pharmacology</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Universities and research institutions in Germany
SCOPE

The Journal of Basic and Clinical Physiology and Pharmacology (JBCPP) is a peer-reviewed bi-monthly published journal in experimental medicine. JBCPP publishes novel research in the physiological and pharmacological sciences, including brain research; cardiovascular-pulmonary interactions; exercise; thermal control; haematology; immune response; inflammation; metabolism; oxidative stress; and phytotherapy. As the borders between physiology, pharmacology and biochemistry become increasingly blurred, we also welcome papers using cutting-edge techniques in cellular and/or molecular biology to link descriptive or behavioral studies with cellular and molecular mechanisms underlying the integrative processes. Topics: Behavior and Neuroprotection, Reproduction, Genotoxicity and Cytotoxicity, Vascular Conditions, Cardiovascular Function, Cardiovascular-Pulmonary Interactions, Oxidative Stress, Metabolism, Immune Response, Hematological Profile, Inflammation, Infection, Phytotherapy.

Join the conversation about this journal
The SJR is a size-independent prestige indicator that ranks journals by their 'average prestige per article'. It is based on the idea that 'all citations are not created equal'. SJR is a measure of scientific influence of journals that accounts for both the number of citations received by a journal and the importance or prestige of the journals where such citations come from. It measures the scientific influence of the average article in a journal, it expresses how central to the global scientific discussion an average article of the journal is.

**Total Documents**

<table>
<thead>
<tr>
<th>Year</th>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>28</td>
</tr>
<tr>
<td>2000</td>
<td>27</td>
</tr>
<tr>
<td>2001</td>
<td>24</td>
</tr>
<tr>
<td>2002</td>
<td>26</td>
</tr>
</tbody>
</table>

**Citations per document**

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>0.527</td>
</tr>
<tr>
<td>2000</td>
<td>0.706</td>
</tr>
<tr>
<td>2001</td>
<td>1.000</td>
</tr>
<tr>
<td>2002</td>
<td>1.179</td>
</tr>
<tr>
<td>2003</td>
<td>0.743</td>
</tr>
<tr>
<td>2004</td>
<td>0.696</td>
</tr>
<tr>
<td>2005</td>
<td>0.763</td>
</tr>
<tr>
<td>2006</td>
<td>0.716</td>
</tr>
<tr>
<td>2007</td>
<td>0.904</td>
</tr>
<tr>
<td>2008</td>
<td>0.988</td>
</tr>
</tbody>
</table>

**Total Cites**

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>5</td>
</tr>
</tbody>
</table>

**External Cites per Doc**

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>20</td>
</tr>
</tbody>
</table>

**% International Collaboration**

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>3.57</td>
</tr>
</tbody>
</table>

**Citable documents**

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>2</td>
</tr>
</tbody>
</table>

**Show this widget in your own website**

Just copy the code below and paste within your html code:
Melanie Ortiz  2 years ago

Dear Oman,

thank you for contacting us.

Unfortunately, we cannot help you with your request, we suggest you visit the journal's homepage or contact the journal's editorial staff, so they could inform you more deeply.

Best Regards, SCImago Team

D  Daniel Orike  2 years ago

Please how do you get original article submitted.

reply

Melanie Ortiz  2 years ago

Dear Daniel, thank you very much for your comment, we suggest you look for author's instructions/submission guidelines in the journal's website. Best Regards, SCImago Team

D  dr jhanvi vaghela  3 years ago

Is Journal of Basic and Clinical Physiology and Pharmacology is online only journal ??

reply
Dear Sir/Madam,
I couldn't find how to publish the article at this journal. Could you possibly send the requirements of publishing at this journal, please?

Kindest regards,
Nilufar
The users of Scimago Journal & Country Rank have the possibility to dialogue through comments linked to a specific journal. The purpose is to have a forum in which general doubts about the processes of publication in the journal, experiences and other issues derived from the publication of papers are resolved. For topics on particular articles, maintain the dialogue through the usual channels with your editor.
Source details

Journal of Basic and Clinical Physiology and Pharmacology
Formerly known as: Reviews in Clinical and Basic Pharmacology
Scopus coverage years: from 1985 to 1988, from 1990 to Present
Publisher: Walter de Gruyter
ISSN: 0792-6855 E-ISSN: 2191-0286
Subject area: Pharmacology, Toxicology and Pharmaceutics: Pharmacology

CiteScore 2021
2.5

SJR 2021
0.347

SNIP 2021
0.728

CiteScore rank & trend

CiteScore rank 2021

Category                                                                   Rank  Percentile
Pharmacology, Toxicology and Pharmaceutics: Pharmacology #203/303 33rd
Pharmacology

Pharmacology, Toxicology and Pharmaceutics: Drug Discovery #109/154 29th

View CiteScore methodology  CiteScore FAQ  Add CiteScore to your site