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Original article

Exploring the Awareness and Counseling Practices of Community Pharmacists in Libya Regarding Drug Interactions with Oral Hypoglycemic Medications

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ABSTRACT

The increasing prevalence of polypharmacy increases the patient's risk of drug side effects and drug interactions, especially among patients with type 2 diabetes. Pharmacists are essential to provide effective education and counseling to these patients. This study aims to assess the awareness and counseling practice of community pharmacists in Libyan regarding potential drug interactions involving oral hypoglycemic agents in patients with type 2 diabetes. A cross-sectional descriptive study was adapted in 2020 in Tripoli, Libya, and included a questionnaire distributed to 150 community pharmacists. The majority of pharmacists (79%) had a bachelor's degree, and (45%) of them had (2-4) years of experience. The vast majority (94%) of participants were familiar with the term drug interactions and counseling guidelines for patients with diabetes. (65%) of pharmacists advised diabetic patients on the appropriate times to check blood sugar levels. (84%) were aware of drugs that interact with oral hypoglycemic drugs. (60%) advised patients to visit their physician if a patient came to their community pharmacy to be dispensed sitagliptin and captopril, to avoid drug interactions with oral hypoglycemic drugs. The study revealed that the majority of Libyan pharmacists in community pharmacies were aware of the term drug interactions and advised diabetic patients, were aware of drugs that interact with oral hypoglycemic drugs.

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INTRODUCTION

Diabetes is one of the fastest growing chronic diseases worldwide, leading to high incidence, morbidity, mortality, and healthcare costs [1]. Diabetes currently affects more than 371 million people, and projections indicate that this number may increase to 552 million by 2030 [2,3]. Local epidemiological research has shown that the prevalence of diabetes among individuals over the age of 20 is 3.8% [4,5]. The increasing prevalence of diabetes is associated with various socio-economic issues, such as reduced productivity, reduced quality of life, reduced survival rates, early retirement, higher treatment costs, and complications [6]. Although diabetes is more prevalent in developed countries, the incidence is expected to increase in developing countries due to continued industrialization [7].

Type 2 diabetes is the most prevalent form of diabetes, marked by elevated blood sugar levels, and it represents nearly 90% of all diabetes cases globally [5]. Individuals with type 2 diabetes continue to produce insulin; however, they may

either not produce sufficient insulin to manage the glucose in their bloodstream or their cells may not effectively respond to insulin, a condition known as insulin resistance. This type of diabetes typically affects individuals in middle age or older, with obesity being the primary risk factor.

The symptoms associated with type 2 diabetes typically emerge slowly and can be ambiguous, leading many individuals to remain unaware of their diagnosis. Common symptoms include increased thirst, hunger, frequent urination, a higher susceptibility to infections, particularly skin infections that are slow to heal, fatigue or low energy levels, and blurred or deteriorating vision [8]. Additionally, individuals with type 2 diabetes frequently require multiple medications to address various comorbidities, which raises the risk of potential drug interactions [1].

Drug interactions occur when the effects of one drug are affected by the simultaneous intake of another drug, food, herbal product, or dietary supplement. These interactions are critical issues that pharmacists and healthcare providers must be aware of when they are involved in the prescribing or dispensing process. Drug interactions can be divided into two major categories: pharmacodynamic interactions and pharmacokinetic interactions [5]. A study conducted in Nepal found that patients who used multiple medications were at greater risk of drug interactions. Specifically, metformin and enalapril were cited as the drugs most at risk for such interactions [9].

Determining the actual prevalence of drug interactions is challenging, as numerous instances remain unreported, do not lead to significant adverse effects, or do not necessitate hospitalization. When hospitalization does occur, it is frequently categorized as an adverse drug reaction instead of a drug interaction, since the interaction may only play a minor role in the overall cause of the patient's admission. Although certain drug interactions are well-documented for specific drugs, considerable evidence indicating possible interactions for many prescription medications is often neglected. Interactions involving oral hypoglycemic agents are mainly linked to sulfonylureas, thiazolidinediones, and glinides. While metformin is recognized for its low interaction potential, caution should be exercised when it is combined with drugs that could impair renal function. [10]. Numerous studies have thoroughly examined interactions involving antidiabetic medications. In 2015 study conducted by Samardzic and Bacic-Vrca revealed that a significant percentage of diabetes patients (80.9%) experienced at least one potential drug-drug interaction (DDI) of clinical importance that necessitated treatment monitoring [11]. Minimizing the potential for drug interactions is essential in pharmacotherapy, as such interactions can result in significant morbidity and mortality [12].

Community pharmacists, in collaboration with physicians, play a vital role in educating patients about the potential risks of side effects and the steps to take if they occur. With their extensive knowledge of medications, pharmacists can relate any unexpected symptoms reported by patients to potential side effects of their medications. Furthermore, clinical pharmacy practice emphasizes the importance of minimizing drug interactions by avoiding medications that may pose risks to at-risk patients. Thus, pharmacists play a critical role in preventing, identifying, and reporting drug interactions. In 2016, Elhatab NM. carried out a study examining the impact of community pharmacists on medication management for type 2 diabetes patients in Tripoli, Libya. The findings indicated that community pharmacists in Libya could play a significant role in enhancing the care provided to individuals with type 2 diabetes [13]. This study aims to assess the awareness and counseling practice of community pharmacists in Libyan regarding potential drug interactions involving oral hypoglycemic agents in patients with type 2 diabetes.

METHODS

Study design and setting

A cross-sectional descriptive study was conducted to assess community pharmacists' awareness and counseling practices regarding potential drug interactions with oral hypoglycemic agents in individuals diagnosed with type 2 diabetes. This study was conducted in Tripoli, Libya, in 2020, and was approved by the School of Pharmacy, Tripoli University, and informed oral consent was obtained from all participants.

Sample size calculation

The sample size was explicitly defined to encompass all registered pharmacists operating within community pharmacies. A random selection of pharmacists was made from diverse geographical regions, with the goal of obtaining a sample of 150 pharmacists from various pharmacies. Pharmacists present at each pharmacy during the visits were invited to participate in the survey.

Study population and sampling

A total of 150 pharmacists from 120 community pharmacies located in Tripoli, Libya was randomly selected for the study. All pharmacists participating in this study were eligible and had to have at least a high diploma or higher, be licensed to practice in their own pharmacies, be registered with the Libyan Pharmacists Syndicate in Tripoli and work

in community pharmacies, and had to be willing to be involved in the study, provide verbal consent, and complete and answer all questions. Pharmacists working in industrial, clinical, and/or academic settings, those with no retail experience, and pharmacy staff who graduated from other medical schools rather than pharmacy schools were excluded.

Data collection and questionnaire

A questionnaire was designed and developed by reviewing the literature and previous studies related to pharmacists' awareness and counseling practices towards drug interactions with oral hypoglycemic drugs [14]. The questionnaire was divided into three parts. The first part contained questions about the demographics of community pharmacists [academic qualification, years of practice, average number of diabetic patients seen during the week, oral hypoglycemic drugs dispensed during the week, and pharmacist activities after graduation]. The second part contained questions about pharmacists' awareness of the term drug interactions, pharmacists' counseling of diabetic patients, the type of counseling provided to these patients, and their awareness of medications that may interact with oral hypoglycemic drugs. The third part discussed measuring pharmacists' awareness of the interaction of oral hypoglycemic drugs with other drugs.

Patients who are prescribed dipeptidyl peptidase-4 inhibitors (DPP-4i) for managing type 2 diabetes may experience a heightened risk of hypoglycemia when these inhibitors are used in conjunction with captopril, as opposed to when DPP-4i are administered alone [3,15.18]. Therefore, we selected the interaction between sitagliptin and captopril as a case study to assess pharmacists' understanding of oral hypoglycemic drug interactions with other medications.

Data analysis

Data obtained from questionnaires were collected and entered into Microsoft Excel 2010, and were analyzed descriptively by frequencies and percentages.

RESULTS

Of the total 150 questionnaires distributed, all questionnaires were answered, representing a 100% success rate. Thus, the required sample size was met to have sufficient power for the analysis.

Socio- demographic characteristics of respondents

Descriptive analysis revealed that the majority of pharmacists 79% (n = 119) had a bachelor's degree while 8% (n = 12) had a postgraduate degree. 45% (n = 67) of pharmacists had (2-4) years of work experience. Metformin was the predominant oral hypoglycemic drug provided by 65% (n = 97) of pharmacists during weekdays. 52% (n = 79) of them saw approximately 20-30 diabetic patients during weekdays. 65% (n = 97) of pharmacists attended a continuing education program since graduation. The vast majority of pharmacists 96% (n = 144) had access to an up-to-date and reliable source of information (Table 1).

Table 1. Socio- demographic characteristics of respondents:

Characteristics	Category	Frequency (%)
Education level	PhD Master Bachelors High diploma	1(0.7) 11(7) 119(79) 19(13)
Years of practical experience	0-1 2-4 ≥5	30(20) 67(45) 53(35)
Average number of patients with diabetes seen during a weekday	4-9 > 10 20-30 50-100 200-300	13(9) 30(20) 79(52) 23(15) 5(3)
Oral hypoglycemic drugs that are dispensed on a weekday	Metformin Metformin + Glimepiride Metformin + Glimepiride + Gliclazide + Glibenclamide Metformin + Glimepiride + Janumet + Vildagliptin + Gliclazide + Glibenclamide	97(65) 67(45) 3(2) 38(25)
Have you enrolled in the continuing education course	Yes No	97(65) 53(35)

since you have been graduation?		
Do you try to access to current and reliable information about the drug?	Yes No	144(96) 6(4)

Pharmacists' awareness practices regarding the term drug interactions

Pharmacists are required to respond to this question with a simple "yes" or "no." about the pharmacist's awareness towards the term drug interactions. The vast majority of pharmacists 94% (n=141) were aware towards the term drug interactions, and only 6% (9%) were unaware of the term drug interactions, as shown in figure 1.

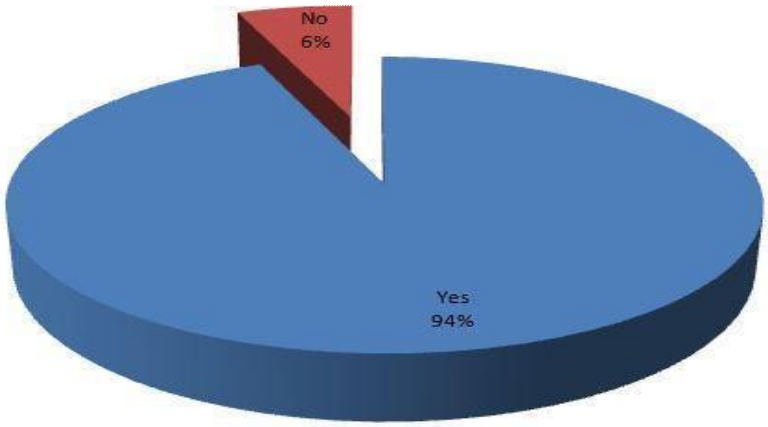

Figure 1. Pharmacist's awareness practices regarding the term drug interaction

Pharmacists' awareness to diabetic patients counseling

94% of community pharmacists were aware of the counseling for patients with diabetes, and we found that only (6%) of them were unaware of the counseling for patients with diabetes, as shown in figure 2.

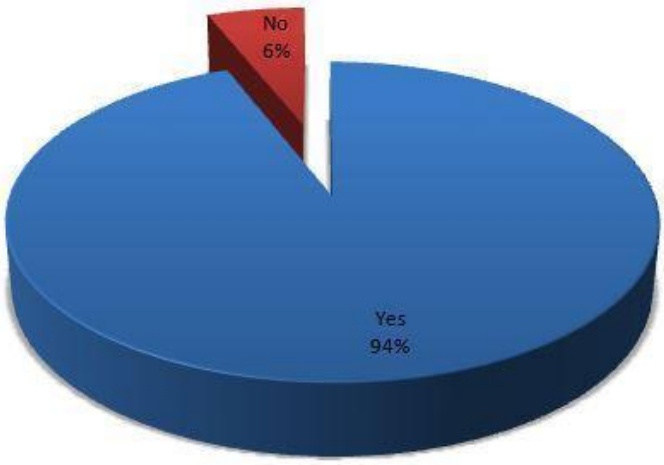

Figure 2. Pharmacists' awareness to diabetic patient counseling

Type of counseling provided to diabetic patients

When pharmacists were asked about the type of advice they give to diabetic patients when dispensing medication, 65% (n=97) indicated the appropriate times to check blood glucose levels, 51% (n=76) described the appropriate time to give each oral hypoglycemic medication, and only 13% (n=20) of them described the potential side effects of antidiabetic and advised giving DDI and FDI, as shown in figure 3.

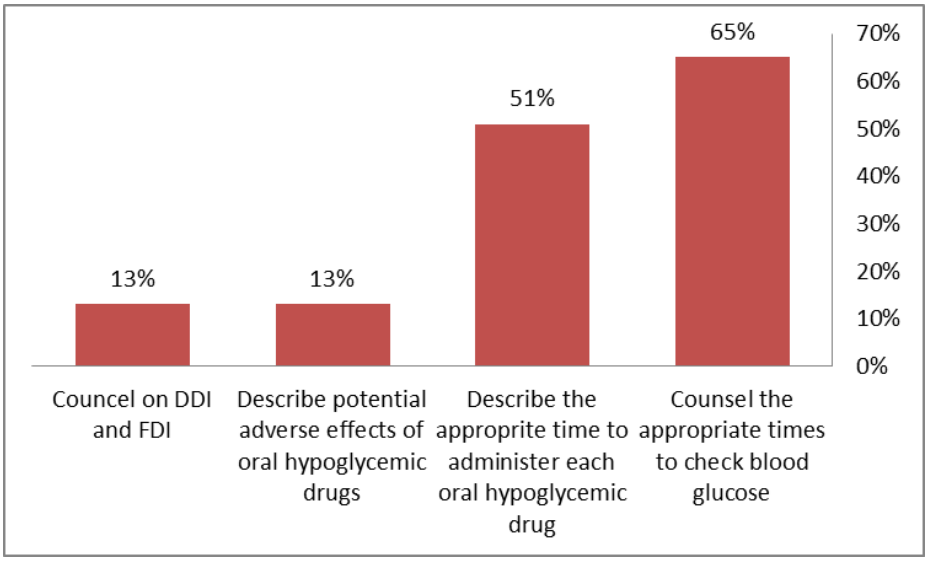

Figure 3. Types of counseling which providing to diabetic patients using oral hypoglycemic drugs

The barriers that obstacle the pharmacist to do patient counseling

Pharmacists were asked to identify barriers that might hinder effective communication; 41% (n = 62) believed that lack of training was the main barrier to counsel their patients, 39% (n = 58) believed that time constraints were the reason, and 19% (n = 28) said that lack of personal support was the reason, as shown in figure 4.

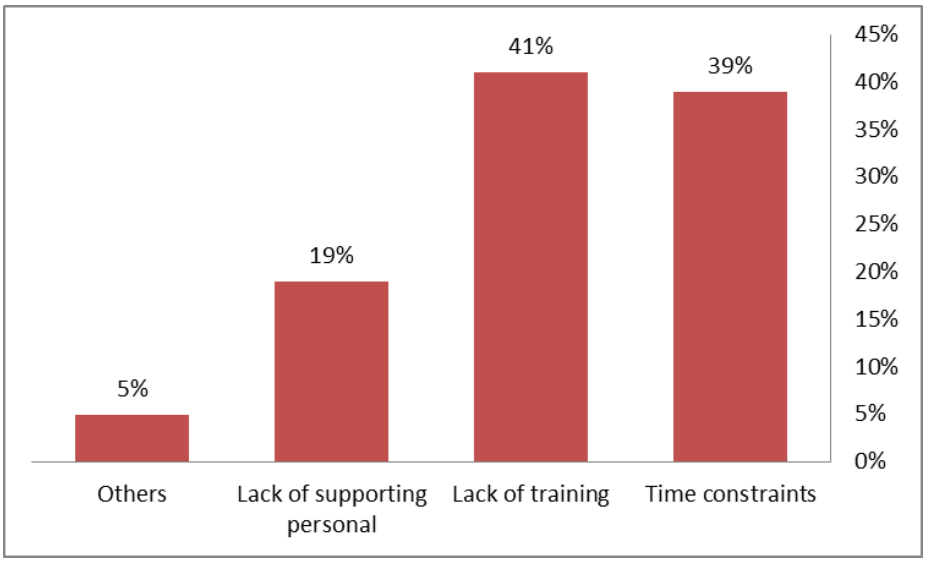

Figure 4. The barriers that obstacle the pharmacist to do patient counseling

Pharmacists' awareness to medicines that may interact with oral hypoglycemic drugs

Pharmacists are required to respond to this question with a simple "yes" or "no." about their awareness of medications that may interact with oral hypoglycemic medications. More than fifty percent of (84%) (126) participants were aware of medications that may interact with oral hypoglycemic medications, while 24 (16%) were unaware of medications that may interact with oral hypoglycemic medications (Figure 5).

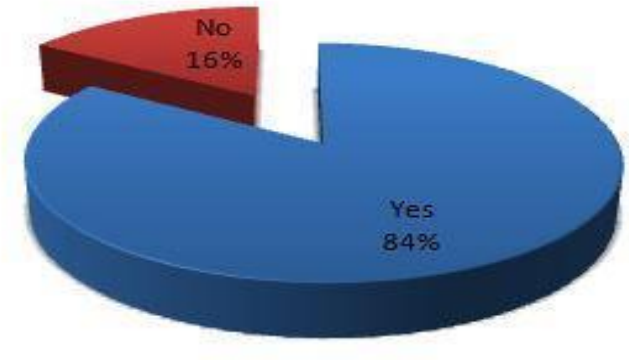

Figure 5. Pharmacists' awareness to medicines that may interact with oral hypoglycemic drugs

What would you do if a patient came to your community pharmacy to be dispensed with sitagliptin and captopril?
Pharmacists were asked to explain what they would do if a patient came to their community pharmacy to be dispensed with sitagliptin and captopril. 60% (109) of the participants advised the patient to visit a physician, 15% (1) changed captopril to another drug after counseling with a physician, 17% (30) hesitated to dispense it, and only 7% (10) changed the sitagliptin after counseling with a physician (Table 2).

Table 2. Pharmacists' actions if a patient comes to their community pharmacy for a fill of sitagliptin and captopril.

Characteristic	Frequency (%)
Advised the patient to visit a physician	109(60)
Changed captopril to another drug after counseling with a physician	1(15)
Hesitated to dispense it	30(17)
Changed the sitagliptin dose after counseling with a physician	10(7)

DISCUSSION

The objective of this study was to examine the level of awareness and the counseling practices of community pharmacists regarding drug interactions involving oral hypoglycemic medications and other drugs in Libyan patients diagnosed with type 2 diabetes. Our results were similar to a 2017 study on metformin-drug interactions involving drug transport proteins that revealed that metformin was the most commonly prescribed oral diabetes medication dispensed by pharmacists on weekdays [15-17]. The data obtained showed that the great majority of pharmacists (94%) have awareness regarding the term drug interactions and are familiar with counseling diabetic patients. A study carried out in 2013 by Nitisha Khunti and colleagues indicates that interventions by pharmacists for type 2 diabetes patients could lead to a decrease in complications, lower mortality rates, and reduced treatment expenses [3]. Although more than sixty-five percent of pharmacists indicated that appropriate times to check blood glucose levels were the most frequently given advice to patients with type 2 diabetes, only thirteen percent of pharmacists provided advice on drug-drug interactions and food-drug interactions when dispensing medications. A 2016 study in Palestine highlighted the significant role of pharmacists in managing blood sugar levels for diabetic patients. Pharmacists regularly inform patients about standard blood glucose values and advise them on the most suitable times for testing their blood sugar. [18].

Globally, drug interactions continue to cause significant and preventable treatment failure. Over a 20-year period, the WHO Global Safety Report Database of Individual Cases detected 3,766 drug interactions. Metformin and amlodipine emerged as the two drugs most likely to interact, as observed in 53 cases, representing 50.47%, according to other studies. The severity of this interaction is significant, leading to concerns about hypoglycemia. Hypoglycemia is a critical condition that may arise from unrecognized drug interactions [20,21]. The current study identified the primary obstacles preventing patients from accessing community pharmacies, with insufficient training being the most prevalent issue, followed by time limitations and inadequate personal support. In contrast to our data, a 2016 study in Palestine found that time constraints ranked first, and lack of patient responsiveness came in second, possibly due to patients' lack of awareness of medical advice and some still seeing the supply of medicines as the primary role of the community pharmacist. Lack of incentive or compensation came in third, as most patients do not pay for these services and often seek to fill their medicines from pharmacies that offer the lowest prices and frequently undervaluing the quality of the

services they receive [18]. The findings of the present study indicate that pharmacists possess a strong awareness of potential drug interactions with oral hypoglycemic medications. Specifically, sixty percent of pharmacists recommended that patients consult a physician to prevent interactions between sitagliptin and captopril. Dipeptidyl peptidase-4 inhibitors (DPP-4i's), commonly referred to as gliptins, represent one of the latest classes of antidiabetic medications. (ADMs) [22]. DPP-4i′s DPP-4 inhibitors were designed to enhance glucose regulation by elevating the levels of incretins (GLP-1 and GIP), which suppress glucagon secretion and stimulate insulin production only as necessary. This approach offers the advantages of minimal weight gain and a low incidence of hypoglycemic episodes [23,24]. Given that individuals with type 2 diabetes frequently present with comorbidities like cardiovascular disease, which may necessitate the use of additional medications for blood pressure or lipid management, it is crucial to evaluate the potential risks of drug interactions when prescribing multiple therapies concurrently [25,26]. The concurrent use of these inhibitors with captopril was correlated with an elevated risk of hypoglycemia, in contrast to the use of DPP-4 inhibitors by themselves.

CONCLUSION

Individuals diagnosed with type 2 diabetes frequently require a combination of medications, which increases their susceptibility to drug interactions. Numerous potentially life-threatening interactions have been recognized concerning oral hypoglycemic agents. The findings of the survey showed that a significant number of pharmacists in community pharmacies were familiar with the term drug interaction and advised patients with diabetes, were aware of drugs that interact with oral hypoglycemic medications, and advised the patient to consult a physician to avoid drug interactions with oral hypoglycemic medications. A pharmacist can provide valuable education to patients regarding the proper administration of medications, evaluate for drug interactions, clarify the use of monitoring devices, and recommend additional products and services. It is essential for physicians prescribing DPP-4i inhibitors to be aware of the potential risks that may occur when these inhibitors are used alongside other medications. Finally, improved awareness and understanding of drug interactions involving oral hypoglycemic medications may reduce drug interactions and improve the quality of life for People suffering from type 2 diabetes.

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Conflicts of Interest

There are no financial, personal or professional conflicts of interest to declare.

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استكشاف ممارسات التوعية والإرشاد لدى صيادلة المجتمع في ليبيا فيما يتعلق بالتفاعلات الدوائية مع أدوية خفض سكر الدم عن طريق الفم

نبيلة الرقيبي*، انشراح بن زكري

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المستخلص

إن الانتشار المتزايد لتعدد الأدوية يزيد من خطر تعرض المريض للآثار الجانبية للأدوية والتفاعلات الدوائية، وخاصة بين مرضى السكري من النوع 2. والصيادلة ضروريون لتوفير التعليم والإرشاد الفعال لهؤلاء المرضى. تهدف هذه الدراسة إلى تقييم ممارسات التوعية والإرشاد لدى صيادلة المجتمع في ليبيا فيما يتعلق بالتفاعلات الدوائية المحتملة التي تنطوي على أدوية خفض سكر الدم عن طريق الفم لدى مرضى السكري من النوع 2. تم تكييف دراسة وصفية مقطعية في عام 2020 في طرابلس، ليبيا، وتضمنت استبيانًا تم توزيعه على 150 صيدلي مجتمع. كان لدى غالبية الصيادلة (79٪) درجة البكالوريوس، وكان لدى (45٪) منهم (2-4) سنوات خبرة. كانت الغالبية العظمى (94%) من المشاركين على دراية بمصطلح التفاعلات الدوائية وإرشادات مرض السكري، ونصح (65%) من الصيادلة مرضى السكري بالأوقات المناسبة لفحص مستويات السكر في الدم، وكان (84%) على دراية بالأدوية التي تتفاعل مع أدوية خفض السكر عن طريق الفم. ونصح (60%) المرضى بزيارة طبيبهم إذا جاء مريض إلى صيدليتهم المجتمعية لصرف سيتاجليبتين وكابتوبريل، لتجنب التفاعلات الدوائية مع أدوية خفض السكر عن طريق الفم. كشفت الدراسة أن غالبية الصيادلة في الصيدليات المجتمعية كانوا على دراية بمصطلح التفاعلات الدوائية ونصحوا مرضى السكري، وكانوا على دراية بالأدوية التي تتفاعل مع أدوية خفض السكر عن طريق الفم.

الكلمات المفتاحية. صيادلة المجتمع، داء السكري، داء السكري من النوع الثاني، أدوية خفض السكر عن طريق الفم، التفاعل الدوائي.