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Factors influencing safe use of drugs among community residents: a cross-sectional study

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Abstract

Background Researchers have paid little attention to the safety of drug use among community residents (CRs). Irrational use of drugs can lead to health risks. We investigated the situation of knowledge–attitude–practices (KAP) of CRs in Shenzhen (China) for safe use of drugs, and analyzed the main factors influencing drug use.

Methods A multi-stage, random sampling method was used. We used a validated questionnaire to conduct an online questionnaire survey on the demographic characteristics and KAP of safe use of drugs of CRs in 10 administrative districts of Shenzhen City. The KAP score of safe use of drugs of CRs was analyzed. Influencing factors were identified using a single-factor chi-squared test and binary logistic regression analysis.

Results A total of 7269 valid questionnaires were collected. The average scores of knowledge, attitude, and behavior were (9.08 ± 1.49) (possible range: 0–10), (37.82 ± 3.96) (possible range: 8–40), and (35.82 ± 4.56) (possible range: 8–40), respectively, indicating that they had a better grasp of safe use of drugs. Logistic regression analysis showed that sex, age, education level, occupation, monthly household income per capita, marital status, health status, and different sources of information were the main factors affecting the knowledge and behavior of safe use of drugs of CRs. In addition to the marital status variable, other variables also have a significant impact on attitude towards safe use of drugs of CRs.

Conclusions Male sex, lower education level, lower income level, average/poor self-rated health status, and single source of drug-use information were the main factors affecting safe use of drugs based on KAP theory. The government and medical workers should carry out various forms of drug-education activities for people with different needs, encourage CRs to learn safe use of drugs, and promote safe use of drugs by CRs through diverse information sources.

Keywords Knowledge–attitude–practices (KAP), Drug safety, Influencing factors, Community residents (CRs)

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Background

Drug therapy is an important means to control disease and maintain health. Due to the dual impact of the aging population and the COVID-19 pandemic, CRs' drug use will become increasingly common [1, 2]. The safe and rational use of drugs can reduce the burden on medical systems [3]. However, unsafe use of drugs can lead to medication errors, adverse drug reactions (ADRs), adverse drug events, and nonadherence to drug regimens [4]. In recent years, countries around the world have paid more and more attention to residents' safe medication behavior. In the large national survey in China, self-medication was found to be common among children under 12 years of age, and as the primary caregivers of children, parents' knowledge level and attitude towards medication safety greatly influenced whether their children used medication properly [5]. Irrational use of drugs is common in Saudi Arabia due to inadequate sources of information, knowledge, and perceptions of self-medication [6]. The current situation of safe use of drugs (SUDs) is very important for reducing irrational use of drugs and improving SUDs.

"Knowledge–attitude–practices" (KAP) methodology is a structured survey method used to gather quantitative and qualitative data on the knowledge gaps, misunderstandings, and misconceptions within a specific population regarding a particular subject [7, 8]. KAP surveys can provide the design of future intervention education with information, to improve the subjects' performance accurately. KAP theory has been widely used in questionnaire development and cross-sectional investigation of individual KAP. A study in Egypt showed that most participants had good knowledge of medication use, but there was substantial room for improvement in attitudes and behavior [9]. A study of community-dwelling elderly patients with chronic diseases in China showed that older adults had uneven scores on various aspects of the medication safety KAP, a low level of knowledge of medication safety, and a moderate level of medication safety beliefs [10].

In this study, KAP was conducted to evaluate SUDs by CRs in China, in order to understand the current situation, influencing factors and risk points of SUDs by CRs. Our data could provide a theoretical basis for the formulation of intervention strategies for SUDs by CRs.

Methods

Study design and respondents

The study protocol was approved (03, 2023) by the Medical Ethics Review Committee of the School of Public Health within Guangdong Pharmaceutical University (Guangdong, China). A cross-sectional survey was conducted in communities in Shenzhen from April to June

2023. A multi-stage, random sampling method was used to extract the data of CRs.

According to the stratification of economic and population distributions, the permanent residents of 10 administrative districts of Shenzhen (Baoan, Longgang, Longhua, Futian, Nanshan, Luohu, Yantian, Guangming, Pingshan, Dapeng New) were selected as representative samples. Social workers in each administrative district selected eligible residents by random sampling.

The inclusion criteria were: (1) permanent residents of Shenzhen for >6 months; (2) aged ≥ 19 years; (3) participated in the questionnaire survey and provided written informed consent voluntarily. Participants were excluded if they had a disability in hearing, speech, knowledge, or other disability that prevented them from cooperating with the survey. Overall, we included the data of 7,269 respondents.

Survey tool

An online questionnaire survey was conducted with the help of the Wenjuanxing platform (<https://www.wjx.cn/>). We collected information about the demographic characteristics, self-rated health status, number of information sources, and SUDs of respondents based on KAP theory. The questionnaire was designed independently. A preliminary draft was compiled according to the research purpose and related literature. The reliability of the questionnaire was confirmed by Delphi Expert Consultation method and pretesting. After statistical analyses, the Cronbach coefficient of the population that answered the questionnaire was 0.770, which indicated that the internal consistency of the questionnaire was "acceptable." The validation factor analysis was used to test the structural validity of the scale for use in Shenzhen, China, and the model fitness indicators were as follows: goodness-of-fit index (GFI)=0.957 (>0.9), root mean square error of approximation (RMSEA)=0.050 (<0.10), comparative fit index (CFI)=0.950 (>0.9), normed fit index (NFI)=0.945 (>0.9), adjusted goodness-of-fit index (AGFI)=0.945 (>0.9), incremental fit index (IFI)=0.950 (>0.9). All the above indicators of validity were qualified and meet the relevant criteria, indicating that the questionnaire model had good structural validity.

The questionnaire comprised: (1) general demographic characteristics (sex, age, education level, occupation, monthly household income *per capita* (MHIPC), marital status, self-rated health status); (2) number of information sources; (3) "KAP Evaluation Index System," which included five sub-dimensions. Among them, 10 items were in the "knowledge" dimension of SUDs ("knowledge of efficacy and safety" (five items), "knowledge of health products and antimicrobial drugs" (four items), and "knowledge of drug storage" (one item)), which were presented in the form of judgment questions. The

value could be “yes” or “no.” Participants received 1 point if they answered correctly and 0 points if they did not. The total score ranged from 0 to 10. Among them, there were one reverse item in “knowledge” dimension, and the score was opposite. In general, the higher the score, the greater the knowledge about SUDs. The attitude toward SUDs comprised eight items: the dimension of “safety awareness before and after drug use” (four items) and the dimension of “drug risk alert awareness” (four items). Scores were based on a Likert scale ranging from 5 (“completely necessary”) to 1 (“completely unnecessary”), with a total score ranging from 8 to 40. The higher the score, the more positive was the attitude toward safe medication. SUDs behavior comprised eight items: the dimension of “compliance with medical drugs” (four items) and the dimension of “self-medication” (four items). Scores were based on a Likert scale ranging from 5 (“often”) to 1 (“never”). The total score ranged from 8 to 40 points. Among them, there were 4 reverse items in SUDs behavior, and the score was opposite. The higher the score, the safer was the drug-use behavior. Finally, with reference to standards for evaluation of health literacy set by the Chinese government [11] and combined with the actual situation of surveyed communities in Shenzhen, the KAP score of respondents was determined based on $\geq 80\%$ correct answers of the total number of items in each dimension. A score of less than 8 in the knowledge dimension was considered low, and above 8 was considered “adequate knowledge”. A score of less than 32 in each of the attitude and behavior dimensions were considered low, and above 32 was considered “positive attitude”, and “proactive behavior”.

Data collection

Social workers in each administrative region were the investigators. They collected questionnaire data and issued the electronic questionnaire to CRs by scanning an online code face-to-face. For older and less educated respondents, investigators helped them read the questionnaire items in a neutral and impartial manner to ensure that they understood the questions and answered them independently. After data collection, members of the research team eliminated unqualified questionnaires. These included too many missing questions, and too short an answer time (< 180 s) through the answer time recorded in the background and manual review. Hence, the quality of the questionnaire was ensured. By June 2023, 8650 questionnaires had been issued, and 7269 valid questionnaires have been recovered (84.03%).

Statistical analyses

Excel™ (2021; Microsoft, Redmond, WA, USA) was used to summarize questionnaire data. SPSS 26.0 (IBM, Armonk, NY, USA) was employed for statistical analyses.

Mean \pm standard deviation was used to describe quantitative data. Percentages were used to describe qualitative data. Demographic characteristics were independent variables. The three dimensions of SUDs based on KAP theory were dependent variables. A single-factor chi-squared test was conducted to analyze the relationship between demographic characteristics and groups. Then, binary logistic regression analysis was adopted. We took the score of the three dimensions of SUDs based on KAP theory as the dependent variable, and factors with significance ($P < 0.05$) in the univariate analysis as the independent variable. Backward conditional (backward: Conditional method) to construct regression model (a model was obtained with the independent variables directly related to the dependent variables). The Hosmer–Lemeshow test was the smallest in the model. $P > 0.05$ indicated that the fit of the global regression model was “good.”

Results

Demographic characteristics of participants

A total of 7269 individuals in Shenzhen were evaluated. Most of the study cohort was female (77.14%) (Table 1). Most participants were aged 35–49 years (42.87%). The education level was mainly high school/vocational high school/technical secondary school (29.45%). Occupations were mainly enterprise personnel, retired personnel, and others, accounting for 83.89% of the total. The MHIPC was in the range of 5000–10,000 yuan (40.53%). The marital status was mainly married/cohabitant (80.99%). Most individuals were not suffering from a particular disease (63.54%). Furthermore, 52.46% of respondents had diverse sources of information on disease.

KAP score for SUDs of respondents

Table 2 shows the KAP score for SUDs of respondents. Among the three dimensions of SUDs using KAP theory, the “attitude toward SUDs” scored the highest, indicating that CRs had the correct attitude toward SUDs. The score of “SUDs behavior” was the lowest, and the number of people with SUDs behavior was relatively less knowledge and attitude, indicating that residents’ drug use behavior must be improved. The score for “SUDs knowledge” was at a moderate level, indicating that CRs had a certain degree of understanding of SUDs knowledge.

Multifactor analysis of drug safety using KAP theory

The KAP score of SUDs among CRs with different demographic characteristics (sex, age, education level, occupation, MHIPC, marital status, health status, number of information sources) was analyzed by the single-factor chi-squared test (Supplementary Tables 1–3). Apart from marital status, we discovered that sex, age, education level, occupation, MHIPC, health status, and

Table 1 Demographic characteristics of participants (n = 7269)

Variable		n	%
Sex	Male	1662	22.86
	Female	5607	77.14
Age (years)	19–34	1584	21.79
	35–49	3116	42.87
	50–64	1584	21.79
	≥ 65	985	13.55
Education	Junior high school or below	1248	17.17
	High school or technical secondary school	2141	29.45
	Junior college	2034	27.98
	Bachelor degree or above	1846	25.40
Occupation	Medical worker	135	1.86
	Civil servant	81	1.11
	Teacher	239	3.29
	Employee of institution	716	9.85
	Employee of enterprise	3070	42.23
	Retiree and others	3028	41.66
Monthly personal income (yuan)	< 5000	2671	36.75
	5000–10,000	2946	40.53
	10,001–15,000	801	11.02
	15,001–20,000	396	5.45
	> 20,000	455	6.26
Marriage	Unmarried	890	12.24
	Married or cohabitating	5887	80.99
	Divorced or separated	254	3.49
	Spouse left home	238	3.27
Health status	Healthy (no disease)	4619	63.54
	Patient (1)	1940	26.69
	Patient (≥ 2)	710	9.77
Number of channels of information	1	1786	24.57
	2	1670	22.97
	≥ 3	3813	52.46

Table 2 Dimension scores and percentage of respondents who could use medications safely (n = 7269)

Dimension	Range of scores	Score (mean ± SD)	Percentage who could use medications safely (%)
Knowledge of medication safety	0–10	9.08 ± 1.49	89.81
Attitude of medication safety	8–40	37.82 ± 3.96	94.26
Practice of medication safety	8–40	35.82 ± 4.56	85.79

number of information sources had significant effects on the KAP score. Using the three dimensions of KAP for SUDs as dependent variables, according to the results of the single-factor chi-squared test, the corresponding meaningful demographic characteristics were selected as independent variables ($P < 0.05$), and multivariate binary logistic regression analysis was carried out.

Possible factors influencing SUDs knowledge

In the binary logistic regression analysis, two regression models were constructed using the backward conditional method. The Hosmer–Lemeshow test value in model 2 was 7.047 ($P = 0.532$), indicating a good fit of the overall regression model. Regression analysis showed that the scores of SUDs knowledge of CRs were

correlated with sex ($P = 0.011$, odds ratio (OR) = 1.275), age ($Wald = 28.547$, $P < 0.001$), education level ($Wald = 112.041$, $P < 0.001$), occupation ($Wald = 19.509$, $P = 0.002$), MHIPC ($Wald = 14.547$, $P = 0.006$), marital status ($Wald = 15.808$, $P = 0.001$), and multiple types of information source ($Wald = 83.249$, $P < 0.001$) (Table 3).

Factors influencing attitude toward SUDs

Binary logistic regression analysis was carried out on the attitude toward SUDs. A backward conditional model was constructed. The Hosmer–Lemeshow test value in model 2 was 4.446 ($P = 0.815$), which did not reach a significant level, indicating that the overall fit of the model was “good.” Regression analysis showed that the score for attitude toward SUDs may be related to sex ($P = 0.005$,

Table 3 Multivariate analysis of SUDs knowledge of CRs

Variable	B	SE	Wald	P	OR	95%CI
Sex (male) (Ref)	–	–	–	–	1	–
female	0.243	0.095	6.523	0.011*	1.275	1.058–1.535
Age (years)	–	–	28.547	<0.001*	–	–
19–34 (Ref)	–	–	–	–	1	–
35–49	–0.136	0.148	0.839	0.360	0.873	0.653–1.167
50–64	–0.575	0.158	13.315	<0.001*	0.563	0.413–0.766
≥ 65	–0.623	0.170	13.366	<0.001*	0.536	0.384–0.749
Education	–	–	112.041	<0.001*	–	–
Junior high school or below (Ref)	–	–	–	–	1	–
High school or technical secondary school	0.673	0.102	43.708	<0.001*	1.960	1.605–2.392
Junior college	0.951	0.119	64.162	<0.001*	2.587	2.050–3.265
Bachelor degree or above	1.437	0.150	91.679	<0.001*	4.209	3.136–5.649
Occupation	–	–	19.509	0.002*	–	–
Medical worker (Ref)	–	–	–	–	1	–
Civil servant	–0.842	0.586	2.068	0.150	0.431	0.137–1.357
Teacher	–0.889	0.486	3.351	0.067	0.411	0.159–1.065
Employee of institution	–1.217	0.444	7.506	0.006*	0.296	0.124–0.707
Employee of enterprise	–0.663	0.433	2.345	0.126	0.515	0.221–1.204
Retiree and others	–0.741	0.432	2.944	0.086	0.477	0.205–1.111
Monthly personal income (yuan)	–	–	14.547	0.006*	–	–
< 5000 (Ref)	–	–	–	–	1	–
5000–10,000	0.269	0.095	7.992	0.005*	1.309	1.086–1.578
10,001–15,000	0.184	0.155	1.425	0.233	1.203	0.888–1.628
15,001–20,000	–0.168	0.195	0.740	0.390	0.845	0.576–1.240
> 20,000	–0.215	0.165	1.690	0.194	0.807	0.584–1.115
Marriage	–	–	15.808	0.001*	–	–
Unmarried (Ref)	–	–	–	–	1	–
Married or cohabitating	0.602	0.159	14.407	<0.001*	1.827	1.338–2.493
Divorced or separated	0.348	0.248	1.969	0.161	1.417	0.871–2.305
Spouse left home	0.648	0.253	6.571	0.010*	1.913	1.165–3.140
Sources of information	–	–	83.249	<0.001*	–	–
1 (Ref)	–	–	–	–	1	–
2	0.384	0.103	14.041	<0.001*	1.469	1.201–1.796
≥ 3	0.873	0.096	83.172	<0.001*	2.393	1.984–2.887
Constant	1.252	0.461	7.391	0.007*	3.497	–

*- $P < 0.05$

OR=1.379), age ($Wald=22.124, P<0.001$), occupation ($Wald=13.020, P=0.023$), MHIPC ($Wald=11.313, P=0.023$), health status ($Wald=8.156, P=0.017$), and diverse sources of information ($Wald=48.575, P<0.001$) (Table 4).

Factors influencing SUDs behavior

Binary logistic regression analysis was undertaken for SUDs behavior. The backward conditional method was used to construct a regression model. The Hosmer–Lemeshow test value of the model was 5.326 ($P=0.722$), indicating a “good” fit of the model. Regression analysis showed that the score for SUDs behavior of CRs may be related to sex ($P<0.001, OR=1.749$), age ($Wald=12.564, P=0.006$), education level ($Wald=11.025, P=0.012$), occupation ($Wald=18.564, P=0.002$), MHIPC

($Wald=13.587, P=0.009$), self-rated health status ($Wald=17.231, P<0.001$), and diverse sources of information ($Wald=74.057, P<0.001$) (Table 5).

Discussion

KAP score of SUDs of CRs must be improved

Patients with chronic diseases and older people have a considerable demand for drugs. However, few studies have focused on the SUDs in the general population and its influencing factors. In the present study, a total score of 80% was taken as the criterion to measure the quality of all dimensions. The attitude of CRs toward SUDs was the highest (94.26%). The behavior toward SUDs of CRs was the lowest (85.79%). The knowledge of SUDs was moderate (89.81%). Compared with the knowledge and attitude toward SUDs, SUDs behavior must be

Table 4 Multivariate analysis of the attitude toward SUDs of CRs

Variable	B	SE	Wald	P	OR	95%CI
Sex (male) (Ref)	–	–	–	–	1	–
female	0.321	0.115	7.801	0.005*	1.379	1.101–1.728
Age (years)	–	–	22.124	<0.001*	–	–
19–34 (Ref)	–	–	–	–	1	–
35–49	0.608	0.141	18.533	<0.001*	1.836	1.392–2.421
50–64	0.116	0.152	0.583	0.445	1.123	0.834–1.511
≥ 65	0.223	0.178	1.565	0.211	1.250	0.881–1.773
Occupation	–	–	13.020	0.023*	–	–
Medical worker (Ref)	–	–	–	–	1	–
Civil servant	0.193	0.882	0.048	0.827	1.213	0.215–6.834
Teacher	0.110	0.658	0.028	0.867	1.116	0.307–4.056
Employee of institution	–0.985	0.535	3.391	0.066	0.374	0.131–1.065
Employee of enterprise	–0.718	0.519	1.912	0.167	0.488	0.176–1.349
Retiree and others	–0.891	0.517	2.968	0.085	0.410	0.149–1.130
Monthly personal income (yuan)	–	–	11.313	0.023*	–	–
< 5000 (Ref)	–	–	–	–	1	–
5000–10,000	0.356	0.120	8.871	0.003*	1.428	1.129–1.805
10,001–15,000	0.138	0.179	0.592	0.442	1.148	0.808–1.630
15,001–20,000	0.379	0.270	1.972	0.160	1.460	0.861–2.478
> 20,000	–0.099	0.204	0.234	0.628	0.906	0.608–1.351
Health status	–	–	8.156	0.017*	–	–
Healthy (no disease) (Ref)	–	–	–	–	1	–
Patient (1)	–0.303	0.117	6.679	0.010*	0.739	0.587–0.929
Patient (≥ 2)	–0.347	0.174	3.994	0.046*	0.707	0.503–0.993
Sources of information	–	–	48.575	<0.001*	–	–
1 (Ref)	–	–	–	–	1	–
2	0.606	0.138	19.322	<0.001*	1.833	1.399–2.402
≥ 3	0.806	0.119	45.871	<0.001*	2.239	1.773–2.827
Constant	2.534	0.536	22.322	<0.001*	12.599	–

*- P<0.05

improved. The knowledge and belief of SUDs of CRs was at the level of knowledge and understanding, and has not been translated into daily drug use. This research result is inconsistent with that of Ma and colleagues. They reported that patients with hypertension had a low literacy level in three dimensions of KAP for SUDs, the highest score of knowledge of SUDs, and the lowest level of drug-use practice [12]. This difference may be attributed to the wide age range of people in the present study, and their deeper understanding and knowledge than that of patients with hypertension. Accumulation of knowledge related to SUDs will lead to changes in beliefs related to drug use, thus showing a higher score for attitude toward SUDs. However, the common point between the two is that SUDs behavior must be strengthened.

Factors influencing SUDs in CRs

The KAP model shows that the growth of health knowledge can lead to changes in health beliefs, thereby affecting health behaviors and reducing the medical burden of diseases [13]. Single-factor analysis showed that different demographic characteristics may have different degrees

of influence on the knowledge, attitude, and behavior of SUDs in CRs. Multivariate logistic regression analysis showed that sex was one of the main factors affecting the KAP score of CRs. This research result is consistent with that discovered by Gong and coworkers. [14]. Women are more likely than men to have good knowledge, attitude, and behavior of SUDs. This observation may be due to two factors. First, women are more careful and rigorous than men, and their reading, comprehension, and practice of medication use are more thorough. Second, men pay less attention to health information than women [15], and women are more likely to obtain medication information from magazines, books, or the Internet [16].

Consistent with data from other studies [17, 18], age had a significant impact on the KAP score for SUDs. The knowledge of SUDs declined with increasing age of CRs. As mentioned by Wang and coworkers [19], with an increase in age, the function of the human body declines gradually. In addition, the cognition and ability to understand drug-use information of older populations declines. We found that people aged > 50 years had a higher score of SUDs behavior than those younger than 50 years. One

Table 5 Multifactorial analysis of SUDs behavior of CRs

Variable	B	SE	Wald	P	OR	95%CI
Sex (male) (Ref)	–	–	–	–	1	–
female	0.559	0.077	52.932	<0.001*	1.749	1.504–2.033
Age (years)	–	–	12.564	0.006*	–	–
19–34 (Ref)	–	–	–	–	1	–
35–49	0.073	0.105	0.482	0.488	1.076	0.875–1.322
50–64	0.365	0.129	8.000	0.005*	1.440	1.119–1.854
≥ 65	0.361	0.147	6.036	0.014*	1.435	1.076–1.914
Education	–	–	11.025	0.012*	–	–
Junior high school or below (Ref)	–	–	–	–	1	–
High school or technical secondary school	0.304	0.104	8.639	0.003*	1.356	1.107–1.661
Junior college	0.132	0.107	1.513	0.219	1.141	0.925–1.408
Bachelor degree or above	0.040	0.117	0.119	0.731	1.041	0.828–1.308
Occupation	–	–	18.564	0.002*	–	–
Medical worker (Ref)	–	–	–	–	1	–
Civil servant	–0.977	0.429	5.195	0.023*	0.376	0.162–0.872
Teacher	–0.743	0.368	4.074	0.044*	0.475	0.231–0.979
Employee of institution	–0.897	0.334	7.228	0.007*	0.408	0.212–0.784
Employee of enterprise	–0.506	0.324	2.441	0.118	0.603	0.319–1.138
Retirees and others	–0.670	0.324	4.283	0.038*	0.512	0.271–0.965
Monthly personal income (yuan)	–	–	13.587	0.009*	–	–
< 5000 (Ref)	–	–	–	–	1	–
5000–10,000	0.198	0.081	5.954	0.015*	1.218	1.040–1.428
10,001–15,000	0.319	0.128	6.270	0.012*	1.376	1.072–1.767
15,001–20,000	0.436	0.180	5.868	0.015*	1.546	1.087–2.200
> 20,000	–0.030	0.145	0.042	0.838	0.971	0.731–1.289
Marriage	–	–	6.579	0.087	–	–
Unmarried (Ref)	–	–	–	–	1	–
Married or cohabitating	0.272	0.119	5.246	0.022*	1.313	1.040–1.657
Divorced or separated	0.257	0.221	1.355	0.244	1.293	0.839–1.992
Spouse left home	0.050	0.225	0.049	0.824	1.051	0.677–1.633
Health status	–	–	17.231	<0.001*	–	–
Healthy (no disease) (Ref)	–	–	–	–	1	–
Patient(1)	–0.114	0.082	1.949	0.163	0.892	0.760–1.047
Patient(≥ 2)	–0.489	0.118	17.198	<0.001*	0.613	0.486–0.773
Sources of information	–	–	74.057	<0.001*	–	–
1 (Ref)	–	–	–	–	1	–
2	0.331	0.093	12.827	<0.001*	1.393	1.162–1.670
≥ 3	0.709	0.083	73.160	<0.001*	2.032	1.727–2.390
Constant	1.035	0.351	8.701	0.003*	2.815	–

*- P<0.05

explanation for this result could be that younger people have to work, and spend less time on complying with medical regimens or self-medication behavior. Taking a specific drug for a long time will increase the familiarity of patients with this drug, and good medication behaviors will result [9]. Moreover, community services for the management of chronic diseases increase the opportunities for patients with chronic diseases to communicate with physicians, which may have a positive impact on the medication behavior of older patients with chronic diseases.

Education level was the main factor that affected SUDs knowledge of CRs. Similar to the results from a European study [20], we found that the level of knowledge about SUDs was positively correlated with the education level. People with a lower education level scored lower on safety knowledge, had less autonomy to understand drug-use information through various information sources, and had lower cognition, so they relied on previous experience of drug use [21]. People with a higher education level had a stronger ability to acquire and understand drug-use information in daily life, and had more channels to acquire information as well as rich reserves of

knowledge [22, 23]. People with a higher level of education could express their needs more accurately when communicating with medical personnel, and the more knowledge they had about a drug, the lower was the corresponding risk of taking the drug.

Occupation was one of the factors influencing the KAP score for SUDs, a result which is consistent with data from previous studies [24]. People engaged in medical institutions scored higher on knowledge and behavior of SUDs. Medical personnel are more likely to have access to various types of health knowledge and have more opportunities to obtain drug-related information.

Higher income was another factor that affected SUDs behavior. We showed that CRs with a lower monthly income exhibited worse SUDs behavior than those with a higher income. This observation is consistent with research from Zhang and colleagues [25]. They showed that nursing staff with a higher income were more likely to acquire more knowledge about drugs and pay more attention to improving their own health. This research result is consistent with data on the influence of socio-economic factors on the development of health events [26].

Health could significantly affect the attitudes and behaviors of CRs toward SUDs, which is consistent with the data revealed by Cho and collaborators [27]. They showed that CRs with good self-rated health status had higher scores for attitudes and behaviors toward SUDs than patients, which may be related to their greater attention to medical care and personal health [28]. In addition, multiple sources of drug-use information were independent factors affecting the knowledge, attitude, and behavior of SUDs, which has not been reported previously. For middle-aged and older people, most drug-use information comes from medical personnel [29]. We found that the KAP score of CRs for SUDs was positively correlated with the diversification of information sources. Combining various forms of publicity to provide CRs with health education for SUDs and increasing the opportunities for CRs (especially older people) to obtain health information could improve the level of SUDs for CRs.

Suggestions on improving the KAP score of SUDs in CRs

The safe and rational use of drugs is conducive to alleviating diseases, reducing medical burdens, and improving quality of life. Our data allow us to make three main suggestions to improve the level of safe medication for CRs. First, several factors affect SUDs (e.g., age, education background). Personalized popularization methods could be developed for specific groups. For older people, simple and clear cards can be used to convey SUDs information to encourage them to have more contact with their grandchildren, which may help them learn and understand drug information [30]. The use of simplified,

enlarged, and specially highlighted information on drug sheets, in a form that patients can understand readily, could guide patients to use drugs correctly. Second, medical personnel are the main source of information for most CRs. More programs on health education/training can be established to enrich the knowledge of medical personnel on SUDs. In addition, SUDs information can be broadcast in public places.

Advantages and limitations of our study

Our research had three main advantages. First, previous studies paid little attention to the problem of SUDs in the general population, whereas we focused on CRs in Shenzhen. Second, our study cohort was from 10 administrative districts in Shenzhen, and was large. Third, we identified the factors affecting SUDs of CRs, which has not been revealed previously.

Our study had two main limitations. First, we collected questionnaires in the form of online code scanning, so it was based on questionnaire data completed by CRs. Hence, there may have been recall bias and understanding bias in some items of drug-use behavior. Second, all CRs were from Shenzhen, so whether research results can be extended to other regions is not known.

Conclusions

Despite that community residents in Shenzhen had a deep understanding of SUDs knowledge and a good attitude, some risky drug-use behaviors remained. Male sex, old age, low education level, low income level, average/poor self-rated health status, and single source of drug-use information were the main factors affecting SUDs based on KAP theory. The government and medical workers should carry out various forms of drug-education activities for people with different needs, encourage CRs to learn SUDs, and promote SUDs by CRs through diversified information sources.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12889-024-19911-x>.

Supplementary Material 1

Supplementary Material 2

Supplementary Material 3

Supplementary Material 4

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Author contributions

Mengdan Xu and Dongmei Zhang contributed equally as co-first authors. Mengdan Xu, Dongmei Zhang conceived and designed the research, and contributed to manuscript revision. Menghuan Yang undertook statistical

analyses and wrote a draft of the manuscript. Wenyu Wu supervised and guided the research. All authors approved the final version of the manuscript.

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Data availability

Data can be obtained by contacting the corresponding author.

Declarations

Ethics approval and consent to participate

The study protocol was approved (03, 2023) by the Medical Ethics Review Committee of the School of Public Health within Guangdong Pharmaceutical University (Guangdong, China). Written informed consent was obtained from all participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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