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ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Agreement between different recall periods in drug utilization studies

Concordância entre diferentes períodos recordatórios em estudos de utilização de medicamentos

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ABSTRACT: ***Objective:*** To assess the agreement between three recall periods for self-reported drug use using a 24-hour recall period as reference. ***Methods:*** Participants were allocated into three groups with different recall periods of 7, 14 and 30 days and were interviewed at two different times. A 24-hour recall questionnaire was answered during the first interview, and a questionnaire on drug use over the different recall periods tested was answered during the second interview. The agreement between the questionnaires was evaluated using percent agreement and kappa. ***Results:*** For continuous drugs, percent agreement varied between 92 and 99% and kappa varied between 0.71 and 0.97 for three periods tested. For drugs of occasional use, percent agreement varied between 63 and 81% and kappa varied between 0.27 and 0.52. The prevalence of drugs, particularly those of occasional use, increases with time. ***Conclusions:*** The high level of agreement between the three recall periods suggests that all of them are valid for the investigation of drugs of continuous use.

Keywords: Drug utilization. Questionnaires. Self report. Mental recall. Validation studies. Pharmacoepidemiology.

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RESUMO: ***Objetivo:*** Avaliar a concordância entre três períodos recordatórios para o auto-relato do uso de medicamentos, utilizando o período recordatório de 24 horas como referência. ***Métodos:*** Os participantes foram alocados em três grupos de acordo com os períodos recordatórios de 7, 14 e 30 dias e entrevistados em dois momentos. Um recordatório de 24 horas foi respondido na primeira entrevista e, um questionário sobre o uso de medicamentos com os diferentes períodos recordatórios avaliados foi respondido na segunda entrevista. A concordância entre os questionários foi avaliada pelo percentual de concordância e kappa. ***Resultados:*** O percentual de concordância variou entre 92 a 99% e o kappa de 0,71 a 0,97 para os medicamentos de uso contínuo nos três períodos recordatórios. Para os medicamentos de uso eventual, o percentual de concordância variou entre 63 a 81% e o kappa oscilou entre 0,27 a 0,52. A prevalência do uso de medicamentos, particularmente para os de uso eventual, aumentou com o tempo. ***Conclusão:*** A análise de concordância sugere que os três períodos recordatórios avaliados são válidos para a investigação da utilização de medicamentos de uso contínuo.

Palavras-chave: Uso de medicamentos. Questionários. Autorrelato. Rememoração mental. Estudos de validação. Farmacoepidemiologia.

INTRODUCTION

Data were collected exclusively through self-reporting questionnaires, that are either self-administered or administered during face-to-face interviews, used extensively in a variety of health studies, including pharmacoepidemiology studies[1,2].

In the majority of cases, the questionnaires are based on recall questions regarding drug use, requiring short, medium or even long-term memory recall from the respondent[1,3-5]. Under-reporting of drug use is considered to result from recall error, even if the error magnitude is not known[6-11].

The recall period used in studies with self-reported data collection has not yet been standardized[12,13]. Each author adopts a preferred period based on convenience or on a trend observed in other studies[13]. This practice may hinder the comparison of estimates of drug use prevalence obtained in different studies[5,12,14,15]. Studies evaluating the recall period and validity of the collected data are scarce. Studies of self-reporting accuracy have used pharmacy and medical prescription records as the gold standard to test the validity of the data[16-18]. However, such records do not exist in all countries and therefore cannot always be used[12].

Lewis et al.[16] studied the influence of the recall period on data accuracy by analyzing the variation in reports of use of prescription and non-prescription drugs over eight weeks, observing a significant decrease in the reported use of the drugs studied, especially drugs of infrequent use and non-prescription drugs.

The objective of this study was to evaluate the level of agreement between 7-, 14- and 30-day recall periods for the self-assessment of drug use using a 24-hour recall period as reference.

METHODS

A cross-sectional study was performed and the sample consisted of professors, staff and students over 18 years of age and capable of communicating from the *Universidade Federal do Rio Grande do Sul* (UFRGS), located in the south of Brazil. A convenience sampling was performed. Interviewers were instructed to recruit participants by approaching people of different ages, of different types of occupation at the university and of both genders in the hallways, offices and rooms of the University buildings to obtain a heterogeneous sample of the university population. The participants were allocated into the three groups by generating a list of sequential numbers using the software SPSS, version 18.0 (SPSS Inc. Released 2009. PASW Statistic for Windows. Chicago: SPSS Inc.). The three groups consisted of 120 participants each, with three different recall periods frequently used in drug use studies (7, 14 and 30 days) assigned to test the influence of longer and shorter recall periods on the agreement with the 24-hour recall period, adopted as a reference in this study.

During the first interview, the interviewers explained the research procedures and scheduled the date for the second interview according to the allocation group. During the first interview, all participants answered the 24-hour recall period questionnaire. During the second interview, which took place 7, 14 or 30 days following the first meeting, the participants answered a questionnaire on drug use over the past seven, 14 or 30 days, depending on the allocation group. Drug use over the past 7, 14 or 30 days included the 24-hour period that the first interview took place.

Data collection was performed between March and June 2012 using questionnaires with open-ended and closed-ended questions, developed by the authors and previously tested in a pilot study. The outcomes variables were the prevalence of drug use during the last 24 hours, 7, 14 or 30 days, obtained through the question: "Did you use any drugs in the last [24 hours] [7 days] [14 days] [30 days], such as analgesics, continuous medication, vitamins, antihistamines, contraceptive (if a woman), ointments or any other type of medication?". In case of a positive response, the medication names were inquired. Sociodemographic and medical variables investigated included gender, age, self-reported race/color, family income, occupation at the university (professor, student or staff), levels of education, health insurance plan, number of drugs in the 24 hours and number of drugs in the 7, 14 or 30 days.

For data analysis, drugs were classified into two main groups according to the type of use (continuous or occasional) reported by the participant. Drugs of continuous use were defined as drugs used for the treatment of chronic and/or degenerative diseases, used continuously. Drugs of occasional use were defined as drugs used for the treatment of acute diseases and/or non-prescription drugs. Within these two groups, drugs were distributed among five classes of drugs according to the classes of higher drug use frequency reported in this sample: cardiovascular system and diabetes drugs, female sex hormones, other drugs of continuous use, analgesics and non-steroidal anti-inflammatory drugs (NSAIDs) drugs and other drugs of occasional use. This categorization was adopted so that the prevalence of use in each therapeutic class was pronounced, and therefore would not interfere in the analysis of kappa, which is influenced by low prevalence of the outcome variable.

Cardiovascular system and diabetes drugs included anti-hypertensive, lipid-lowering and hypoglycemia drugs. The group "other drugs of continuous use" included anti-asthmatic drugs, anti-thyroid drugs and drugs acting on the central nervous system. Female sex hormones included contraceptive and hormone replacement drugs. The group "other drugs of occasional use" included anti-histamines, antibiotics, expectorants, gastrointestinal and dermatological disorder drugs and supplements, among other categories.

The agreement between the 24-hour recall period and the questionnaires with greater recall periods were evaluated using the kappa coefficient and percent agreement. The level of agreement was based on drugs reported at both the first and second questionnaires. More specifically, for the comparison between the 24-hour recall period and the 7, 14 or 30-day recall periods, the agreement was calculated based on data provided by the 107, 97 or 95 participants who answered the second questionnaire 7, 14 or 30 days after the first questionnaire, respectively. The agreement was evaluated in accordance with the name of the drug. If, for example, in the second questionnaire a participant reported use of "captopril", there was an agreement if he/she had reported "captopril" in the first questionnaire (24 h). It was included positive agreement (drug reported in the first questionnaire but not in the second) or negative agreement (drug reported in the second questionnaire but not in the first one).

A value of kappa between 0.8 and 1.0 indicated very good agreement, between 0.6 and 0.8 good agreement, between 0.4 and 0.6 moderate agreement, between 0.2 and 0.4 acceptable agreement and lower than 0.2 poor agreement[19].

The sociodemographic characteristics of the participants were compared using the Pearson χ^2 test for proportions to verify the similarity between groups of the 7, 14 and 30 days recall periods. All analyses were performed using a 5% significance level.

The questionnaires were digitalized using the system Teleform Workgroup V10 and stored and analyzed using the software SPSS, version 18.0.

This study was approved by the Research Ethics Committee of the *Universidade Federal do Rio Grande do Sul* (UFRGS), under record No. 21,801. Data were collected only after the Informed Consent Form was signed.

RESULTS

Of the 360 participants who answered the 24-hour recall period questionnaire during the first interview, 299 (83%) of them completed the study by answering the second questionnaire. Eleven percent of the participants from the 7-day recall period group, 19% from the 14-day recall period group and 20% from the 30-day recall period group did not answer the second questionnaire and were counted as losses. A significant difference was observed between the participants who completed the study and the ones who did not complete it only for the variable occupation at the university ($p < 0.05$), with the largest number of losses being observed for category "professors" and for the 30 days recall period group. Not arriving on the scheduled day and place for the second interview and difficulties in contacting the participants were some of the reasons for non-response to the second questionnaire.

The sociodemographic and medical characteristics of the participants are presented in Table 1. The majority of the participants were white women under 50 years old. The average age was 41 years old (SD ± 13.3), and age varied between 18 and 94 years old. The majority of the participants had 12 years or more of education and belonged to the university staff. There were significant differences in family income and occupation ($p < 0.05$) among the allocation groups. For family income, 7 days recall period group had a lower percentage for income above R$5,000.00 and the group of 14 days, the highest percentage in this category. For occupation, there were fewer professors and more students for 7 days recall period group in relation to the others groups.

The prevalence of drug use for the different allocation groups is presented in Table 2. The prevalence of drugs, particularly those of occasional use, increases with time.

The kappa coefficients and agreement percentages between the 24-hour recall period questionnaire and the questionnaires for the 7-, 14- and 30-day recall periods are presented on Table 3.

Agreement between the 24-hour recall period and the longer recall periods tested for drugs of continuous use was high, with values between 92.6% and 99.0%. Kappa was slightly higher for the 7-day recall period group than for the 14- and 30-day groups. The agreement percentages for drugs of occasional use were lower than for drugs of continuous use, between 63.1 and 71.1% for analgesic and NSAIDs and between 72,2 and 81,3% for other drugs of occasional use. Kappa was lower for drugs of occasional use than for drugs of continuous use, between 0.27 and 0.52 for all groups studied.

Table 1. Sociodemographic and medical data of study participants in the different allocation groups (n = 299).

Variables	Total		7 days (n = 107)		14 days (n = 97)		30 days (n = 95)		p-value
	n	%	n	%	n	%	n	%	
Gender									
Female	177	59.2	57	53.3	63	65.0	57	60.0	0.233
Male	122	40.8	50	46.7	34	35.0	38	40.0	
Age Group (years)									
18 to 30	86	28.8	37	34.6	23	23.7	26	27.4	0.344
31 to 49	129	46.2	46	43.0	48	49.5	35	36.9	
50 or more	84	25.0	24	22.4	26	26.8	34	35.7	
Self-reported race/color									
White	225	75.3	84	78.5	72	74.3	69	72.6	0.603
Non-White	74	24.7	23	21.5	25	25.7	26	27.4	

Continue...

Table 1. Continuation.

Variables	Total		7 days (n = 107)		14 days (n = 97)		30 days (n = 95)		p-value
	n	%	n	%	n	%	n	%	
Level of Education (in years)									
Up to 8	38	12.7	15	14.0	13	13.4	10	10.6	0.457
9 to 11	92	30.8	30	28.0	29	29.9	33	34.7	
12 or more	169	56.5	62	58.0	55	56.7	52	54.7	
Family Income									
500 to 2 thousand Reais**	116	38.8	45	42.0	35	36.0	36	37.9	0.031*
> 2 thousand to 5 thousand Reais	93	31.1	39	36.4	22	22.7	32	33.7	
> 5 thousand Reais	90	30.1	23	21.6	40	41.3	27	28.4	
Occupation									
Staff	207	69.2	74	69.2	64	66.0	69	72.6	0.004*
Student	63	21.1	30	28.0	16	16.5	17	17.9	
Professor	29	9.7	3	2.80	17	17.5	9	9.5	
Health Insurance Plan									
Yes	198	66.2	68	63.5	65	67.0	65	68.4	0.751
No	101	33.8	39	36.5	32	33.0	30	31.6	
N° of drugs in the 24-hour recall period									
0	91	30.4	33	30.8	24	24.7	34	35.8	0.278
1	94	31.4	35	32.7	30	3.9	29	30.5	
2	51	17.1	19	17.8	18	18.6	14	14.7	
3	32	10.7	9	8.4	17	17.5	6	6.3	
4 or >	31	10.4	11	10.3	8	8.2	12	12.6	
N° of drugs in the 7, 14 or 30 days									
0	51	17.1	20	18.7	14	14.4	17	17.9	0.279
1	95	31.8	43	40.2	26	26.8	26	27.4	
2	69	23.1	21	19.6	27	27.8	21	22.1	
3	42	14.0	9	8.4	16	16.5	17	17.9	
4 or >	42	14.0	14	13.1	14	14.4	14	14.7	
Total	299	100	107	35.8	97	32.4	95	31.8	

*Ratio test based on Pearson's chi-square test ($p < 0.05$). **Brazilian currency.

DISCUSSION

This study investigated the level of agreement of three recall periods of 7, 14 and 30 days through the agreement analysis of questionnaires compared to the 24-hour recall period, in a population sample from a university in the south of Brazil. For drugs of continuous use, the three recall periods tested — 7, 14 and 30 days — presented very good agreement with the reference recall period of 24 hours. For drugs of occasional use, however, the agreement with the reference period (24 hour recall period) was only acceptable.

A small variation in agreement percentage was observed among the 7-, 14- and 30 day recall periods for drugs of continuous use. Kappa was lower for the 14- and 30-day periods than for the 7-day period for all three classes of drugs analyzed. This difference was, however, not very pronounced, indicating that the influence of the error of self-reporting of drug use depending on the recall period adopted is small or null.

Table 2. Prevalence of drugs use for the 24-hour and for the 7-, 14- or 30-day recall periods*.

Drug type	24-hour recall period (n = 299)			7 days (n = 107)			14 days (n = 97)			30 days (n = 95)		
	n	%	95%CI	n	%	95%CI	n	%	95%CI	n	%	95%CI
Use of Drug	208	69.6	64.1 – 74.5	87	81.3	72.7 – 87.6	83	85.6	77.0 – 91.3	78	82.1	73.0 – 88.6
Continuous use	130	43.5	37.9 – 49.2	47	43.9	34.8 – 53.5	48	49.5	39.6 – 59.4	39	41.1	31.6 – 51.2
Cardiovascular System and Diabetes	70	23.4	18.9 – 28.6	22	20.6	13.9 – 29.3	19	19.6	12.8 – 28.7	22	23.2	15.7 – 32.7
Female Sex Hormones	45	25.4	18.6 – 31.6	14	26.3	14.0 – 37.0	23	36.5	24,6 – 48,3	17	29.8	17,9 – 41,7
Other Drugs of Continuous Use [τ]	52	17.4	13.5 – 22.1	24	22.4	15.5 – 31.3	14	14.4	8.7 – 23.0	14	14.7	8.9 – 23.4
Occasional Use	132	44.1	38.6 – 49.9	68	63.6	54.0 – 72.1	64	66.0	56.0 – 74.7	63	66.3	56.2 – 75.1
Analgesics and NSAIDs**	68	22.7	18.3 – 27.9	49	45.8	36.6 – 55.3	39	40.2	30.9 – 50.3	52	54.7	44.6 – 64.5
Other Drugs of Occasional Use [φ]	85	28.4	23.6 – 33.8	29	27.1	19.5 – 36.3	39	42.3	32.8 – 52.3	28	29.5	21.1 – 39.4

*The same participant may have used more than one class of drugs; **NSAIDs: painkillers and non – steroidal anti – inflammatory drugs; [τ] Other continuous – use drugs: anti – asthmatic drugs, anti – thyroid drugs and drugs acting on the central nervous system; [φ] Other occasional – use medications: antihistamines, antibiotics, expectorants, drugs for gastrointestinal disorders, dermatological drugs and supplements, among others; The prevalence of the use of female sex hormones was restricted to females (n = 177).

The agreement between the questionnaires for the 7-, 14- and 30-day periods and the 24-hour recall period was considered very good, according to Altman[19], for cardiovascular system and diabetes acting drugs and for female sex hormones. Agreement was also classified as very good for other drugs of continuous use for the 7- and 14-day periods but not for the 30-day recall period, which was classified as good. These findings indicate a small loss of information among the three recall periods tested and thus a small magnitude of recall error in the reporting of drugs of continuous use.

For analgesic and NSAIDs, Kappa indicated acceptable agreement[19] between the three tested recall periods and the 24 hour reference period. An increase in the prevalence of the use of analgesic and NSAIDs was observed for the three recall periods tested when compared with the 24-hour recall period, which was mainly related to the occasional use of these drugs during the different recall periods, which made the analysis of the magnitude of the recall error for these drugs difficult. The different prevalence observed for the different recall periods indicates that the same recall period should be used to allow comparison among studies of the use of analgesic and NSAIDs[16].

Table 3. Agreement between drug use questionnaires between the 24-hour and the 7-, 14- or 30-day recall periods*.

Types of Drugs	7 days (n = 107)			14 days (n = 97)			30 days (n = 95)		
	% Agreement	k	95%CI	% Agreement	k	95%CI	% Agreement	K	95%CI
Use of Drug	78.5	0.43	0.34 – 0.53	81.4	0.42	0.31 – 0.53	73.7	0.36	0.26 – 0.45
Continuous Use	98.1	0.96	0.93 – 0.98	91.7	0.83	0.78 – 0.89	87.4	0.74	0.67 – 0.81
Cardiovascular System and Diabetes	99.0	0.97	0.94 – 1.0	97.0	0.90	0.85 – 0.96	92.6	0.81	0.74 – 0.88
Female Sex Hormones	98.1	0.92	0.87 – 0.98	95.9	0.88	0.82 – 0.94	94.7	0.80	0.71 – 0.88
Other Continuous – Use Drugs [τ]	97.2	0.92	0.88 – 0.97	95.9	0.82	0.74 – 0.91	92.6	0.71	0.61 – 0.82
Occasional Use	64.5	0.32	0.24 – 0.40	69.0	0.37	0.27 – 0.46	59.0	0.24	0.16 – 0.32
Painkillers and NSAIDs	65.4	0.27	0.19 – 0.36	71.1	0.36	0.26 – 0.45	63.1	0.30	0.23 – 0.37
Other Occasional – Use Medications [φ]	81.3	0.52	0.42 – 0.61	72.2	0.40	0.30 – 0.49	76.8	0.34	0.24 – 0.45

*All *p*-values of the analyses done for the Kappa coefficient (H0: Kappa = 0) were < 0.001; [τ] Other continuous – use drugs: anti – asthmatic drugs, anti – thyroid drugs and drugs acting on the central nervous system; [φ] Other occasional – use medications: antihistamines, antibiotics, expectorants, drugs for gastrointestinal disorders, dermatological drugs and supplements, among others.

Studies comparing self-reported drug use with pharmacy and medical prescription records reported higher agreement between the pharmacy records and participant reports for drugs of continuous use, such as anti-hypertensive, hormonal therapy, cholesterol lowering, anti-depressant and anti-diabetic drugs than for drugs of occasional use, such as anti-inflammatory drugs. This pattern suggests that the agreement varies with the therapeutic class of the drug[18,20-26] and that the high agreement of self-reported drug use found for continuous drugs cannot be generalized to other types of drugs[24].

Drugs of continuous use to treat chronic diseases, such as cardiovascular system drugs, have been repeatedly observed to be more likely to be accurately reported by individuals than drugs of occasional use, as occasional use drugs are used for self-limiting diseases and for short periods or sporadically[27,28]. The greater ease of study participants in recalling continuous drug use may be related to the daily routine of the use of these drugs[27]. It should also be considered that the use of drugs of continuous use may be present in the respondent's memory because daily use is always at a maximal time distance of 24 hours, with the occasional forgetting of one or more drug doses during the reference periods as the only potential recall problem.

Data on drug use obtained directly from the drug user through population surveys is the method most often used in drug use studies in developing countries, including Brazil, where there are no efficient computerized systems that integrate information on drugs and drug users. Such systems are generally considered the gold standard in surveying population drug exposure and are used as references in validity studies[2,17,18,23]. In the absence of a gold-standard that can be used to test the validity of data on drug use over an optimal recall period, the 24-hour recall period used in this study seems to be a good alternative as the most accurate method for comparison with longer recall periods.

It is necessary to consider that, in addition to factors related to the accurate recall of medication use, there are other factors that may have interfered in the non-agreement between the responses in the different recall periods. For example, changes in responses may represent changes in prescription or pattern of drug use between the periods assessed, or even, by adherence problems in a period of adaptation to medical prescription.

The relatively small sample size, hindering the analysis of therapeutic drug classes with lower use prevalence, and the restriction of the sample to the younger university population, making it relatively socioeconomically homogeneous, are limitations of this study. The choice of the university population was motivated by the easiness location of the individuals, considering the need for a second contact in a determined period of time. For this reason, generalizations of the results of this study for populations much older than the one used in this study, with lower levels of education and family income should be made with caution. Another study limitation was the number of losses, higher for the 14 and 30 day recall periods, where teachers were the majority of those who did not respond to the second questionnaire, mainly in the 30-day recall.

CONCLUSION

The results of this study allow the conclusion that the three recall periods tested (7, 14 and 30 days) seem to have little influence on the estimation of the kappa coefficient for drugs of continuous use, suggesting that the recall error had little effect on the underestimation of the prevalence of the use of drugs of continuous use. As 14- or 15-day recall periods have been used most often in previous studies[13,29-31], the adoption of the 14-day recall period is suggested to make comparisons among future studies easier, especially for the investigation of drugs of continuous use. For studies evaluating drugs of occasional use, such as analgesic and non-steroidal anti-inflammatory drugs, we suggest the use of shorter recall periods, in accordance with Lewis et al.[16].

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