Relationship of Consumers' Perceptions of Drugs to Drug Use

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SYNOPSIS

To examine consumers' perceptions of nonprescription and prescription drugs and the relationship of these perceptions to drug use, a sample of 200 adult residents of a northern midwestern area who were similar in age and education to the national population was surveyed. Respondents who rated nonprescription drugs as safe and somewhat effective used nearly 90 percent less nonprescription drugs than respondents rating these drugs as safe and ineffective. Respondents who rated prescription drugs as unsafe used approximately 60 percent less of them than respondents rating them as somewhat safe or safe.

Data for the study were collected from March 15 to May 15, 1978. The respondents' perceptions of nonprescription and prescription drugs in respect to safety, efficacy, side effects, and overdose effects were measured on a thermometer scale, with anchors at three points (100° for the most positive perception, 50° for the midpoint, and 0° for the most negative perception). Drug use, based on the respondents' recollections, was measured for 2 days before the interview.

The respondents rated prescription drugs as safer and more effective than nonprescription drugs, but as having more dangerous overdose effects. Two-way analysis of variance showed that perceptions of the safety and effectiveness of nonprescription drugs and the interaction between these two variables were related to the use of these drugs. Perceptions of the safety of prescription drugs were related to their use.

GIVEN THE WIDE USE AND POTENTIAL HAZARDS of both nonprescription (OTC—over-the-counter) and prescription (Rx) drugs, the public's perceptions of their safety and efficacy need to be taken into account in formulating public policy and promoting drug regimen compliance. A 1968-69 survey of 3,481 persons in the Baltimore Standard Metropolitan Statistical Area showed that within a 2-day period before they were interviewed, 36 percent had used an average of 1.4 different kinds of OTC drugs, and 33 percent had used an average of 1.8 kinds of Rx drugs (*1*). (For an overview and summary of research dealing with drug use, see "Perspectives on Medicine in Society" (*2*).)

Numerous studies have been done on drug defaulting (*3*), the lack of compliance with drug regimens. The gap between the drug treatment recommended and the treatment that people actually self-administer is wide. Approximately half of the patients for whom medication is prescribed over long periods fail to adhere to their regimens. Compliance with regimens for medications prescribed over short periods also is highly variable, and compliance may deteriorate over time. Noncompliance can take several forms such as undermedicating by the reduction or omission of doses or by improper discontinuance of the drug treatment as well as by overmedicating through increased dosage.

The potential risks from drug misuse are serious —adverse reactions, accidental overdose effects, deprival of therapeutic benefits, and economic waste. Drug-induced illnesses can require hospitalization and even result in death (*4,5*).

As of December 1980, panels that the Food and Drug Administration (FDA) had created in 1972 to review OTC drugs for safety and efficacy (*6*) had reviewed 722 active ingredients and rated approximately one-third as safe and effective for their intended use, one-third as unsafe or ineffective, and one-third as in need of further study (*7*). By October 17, 1981, all the panels had presented their results and been adjourned.

The Food and Drug Administration is also responsible for the safety and efficacy of Rx drugs. Before 1962, the agency had cleared Rx drugs for safety only, but it is presently also reviewing all Rx drugs approved between 1938 and 1962 for efficacy (*8a*). For example, the FDA proposed (*a*) reclassification of "certain anticholinergics or antispasmodics in combination with a sedative and single-entity

antispasmodics in conventional dosages" as lacking substantial evidence of effectiveness and (*b*) withdrawal of new drug applications. Thirty products were mentioned in this notice (*9*). Thus, the FDA demonstrates ongoing concern for the biological consequences of drug use.

The Food and Drug Administration, however, has evidenced little interest in consumers' perceptions of drugs, even though attitudes about drugs affect drug use. (For a discussion of consumers' perceptions and attitudes, see "Consumer Behavior" (*10*) and "Attitude Research at Sea" (*11*).) Morris and Kanouse (*12*) and Silverman (*8b*) have recognized and discussed the relationship between attitudes and drug-taking behavior.

The current study was done to upgrade our understanding of self-medicating behavior. Consumers' perceptions of the safety, effectiveness, side effects, and effects of overdose of OTC and Rx drugs and the relationships that these perceptions might have with drug use were investigated.

Previous Research

Drug safety was investigated in 1966 and 1972 FDA studies edited by Knapp (*13*). The 1966 FDA study was based on a sample of 949 females and 100 males residing in the continental United States. The objective of the survey was to provide information on consumers' knowledge and understanding of the factors that affect drug shopping, label reading, use, and storage. In the 1966 study, 65 percent of the respondents rated OTC drugs in the safe range (scores of 3 or less), and 94 percent rated Rx drugs in the safe range. (In rating the drugs they used a 6-point scale ranging from "very safe"—1 to "not safe at all"—6.) The most frequent reason that the respondents gave for the OTC ratings was "if used in accordance with the label;" the most frequent reason given for the Rx ratings was doctor reliability.

The objective of the 1972 FDA study, which was based on a national probability sample of 2,005 adults residing in the conterminous United States, was to examine consumer's general feelings about drug safety and trust. Forty-eight percent of the respondents rated OTC drugs as unsafe, and 86 percent rated Rx drugs as safe. The most frequent reasons given for rating OTC drugs unsafe (explanations for the safe ratings were not available) were accidental improper use and side effects; for Rx safe ratings, the most frequent reason was doctor reliability. In a separate question about drug safety, respondents were given thermometer scales ranging from 0° to 100°. Based on these scales, 52 percent of the respondents rated OTC drugs in the unsafe range (again, explanations for safe ratings were not available), and 72 percent rated Rx drugs in the safe range (50° or more). Thus, safety ratings for both kinds of drugs were lower in 1972 than in 1966. Other results of the 1972 study revealed a lack of consensus among respondents about the trends in drug safety. Thirty-nine percent indicated that they believed drugs were getting "more safe," 28 percent indicated they were "staying the same," and 25 percent indicated they were "less safe." Sixty-eight percent of these same respondents expressed the belief that Rx drugs were safer than OTC drugs, whereas 8 percent rated OTC drugs as safer. (In a separate test in which the respondents were asked to rate a number of products in respect to safety, prescription drugs were rated higher than OTC drugs.) Age was positively related to the perception of Rx drug safety, and education was negatively related. No statistical analysis beyond frequency distributions was presented for either the 1966 or 1972 study data.

There is little published research on the general effectiveness of OTC drugs. Of 420 OTC products reviewed in a 1971 National Academy of Sciences-National Research Council panel report, 85 percent were rated as lacking evidence of effectiveness (*14*).

The perceived side effects of drug use also were examined in the FDA studies (*13*). In the 1972 FDA study, 35 percent of the respondents indicated that side effects from medicine happen "a lot," 57 percent indicated that they happen "a little," 1 percent indicated that they happen "not at all," and 7 percent did not respond to the question. The side effects from both OTC and Rx drugs can be severe and in some cases fatal (*15–17*). Caranasos and associates (*4*) reported that adverse reactions to OTC drugs have been responsible for approximately one-fifth of all hospitalizations induced by drugs. Aspirin, bromides, calcium preparations, sodium bicarbonate, high doses of vitamin D, and some cough elixirs can have unpleasant side effects. OTC drugs, however, despite their wide availability, are rarely contributors to fatal accidents—with the possible exception of aspirin, camphor, and phenolphthalein (*5,16,18*).

Since Rx drugs are usually more powerful than OTC drugs, they are considerably more likely to produce side effects, and these side effects can be more serious than those from OTC drugs. Incidences of toxicity and death from accidental overdose are also more common for high-potency Rx drugs than for OTC drugs.

Methods

For the current study, a representative sample of 200 adults residing in a northern midwestern metropolitan area was drawn that was similar in education and age to the national population. Data were collected from the respondents from March 15 to May 15, 1978, at local meeting places, such as community centers and churches. Incentives of $2 per completed questionnaire were provided either to the respondent or to an organization of his or her choice.

The respondents' perceptions of safety, efficacy, side effects, and the effects of accidental overdose were measured for OTC and Rx drugs on matched thermometer scales similar to those used by Knapp (*13*). On the sheets of paper on which the thermometer scales were printed, space was provided for the respondents to explain their ratings of both the OTC and Rx drugs on the four variables. There were anchors at three points on the thermometer scale: 100° for the most positive perception, 50° for the midpoint, and 0° for the most negative perception.

It was anticipated that perceptions of safety, efficacy, overdose effects, and side effects would be different for OTC drugs than for Rx drugs and that these perceptions would be related to drug use. Drug use was measured based on respondents' recollections of such use in the 2 days before the interview.

Results

Respondents in the sample reported greater drug use than did the respondents in the Rabin and Bush study (*1*). Fifty-three percent of the sample had used an average of 1.7 different kinds of OTC drugs 4.1 times, and 38 percent had used Rx drugs 2.9 times, in the 2 days before the interview. No attempt was made to measure the kinds of Rx drugs used because a pilot study had indicated that consumers are vague about Rx drug varieties. This observation is consistent with the findings of Caranasos and associates (*4*). Mean OTC drug use frequency for the 200 respondents was 2.2 times in the 2 days before the interview. Mean Rx drug use frequency for these same respondents was 1.1 times.

Table 1 shows the results of a matched pairs *t*-test that was used to examine respondents' perceptions of Rx and OTC drugs. The following results of that test met the required 0.05 level of significance.

Table 1. Percentages of respondents assigning ratings of 50° or more to nonprescription (OTC) and prescription (Rx) drugs on safety, effectiveness, side effects, and overdose effects

Variables	Percent assigning ratings of 50° or more	Mean degrees	Standard deviation	t-test	Probability (2-tailed)
Safety (100° = very safe):					
OTC drugs	76	55.1	24.0	7.65	0.000
Rx drugs	90	71.3	23.6		
Effectiveness (100° = very effective):					
OTC drugs	72	52.5	22.5	12.58	.000
Rx drugs	95	75.9	19.5		
Side effects (100° = severe):					
OTC drugs	58	48.0	27.8	1.26	.210
Rx drugs	64	50.7	29.0		
Overdose effects (100° = dangerous):					
OTC drugs	82	70.5	26.4	3.74	.000
Rx drugs	90	76.9	24.2		

1. Rx drugs were rated as safer and more effective than OTC drugs but as having more dangerous overdose effects.

2. The mean ratings for Rx drugs were between "somewhat safe" and "safe;" between "somewhat effective" to "effective;" close to "somewhat severe" side effects; and between "somewhat dangerous" and "dangerous" overdose effects.

3. The mean ratings for OTC drugs were close to "somewhat safe," "somewhat effective," and "somewhat severe side effects," and between "somewhat dangerous" and "dangerous" overdose effects.

Consumers in the current study had more positive perceptions of the safety of both OTC and Rx drugs than did those in the 1972 FDA study. (The two samples, however, are not entirely commensurate.) Ninety percent of the respondents in the current study rated Rx drugs in the safe range compared with 72 percent in the earlier study. In the current study, 76 percent of the respondents rated OTC drugs in the safe zone compared with 48 percent or less in the 1972 study.

Respondents who explained their drug ratings listed a variety of reasons for them. The typical reasons listed for ratings on safety, effectiveness, side effects, and overdose effects are shown in table 2. Respondents usually gave one or two reasons for each rating. Personal experience was the most common one given for ratings on safety, effectiveness, and side effects. Respondents who rated OTC drugs in the unsafe range also included as reasons

Table 2. Typical reasons that respondents listed for their ratings of drugs on safety, effectiveness, side effects, and overdose effects

Ratings	Safety—100° = very safe (N = 80)	Effectiveness—100° = very effective (N = 63)	Side effects—100° = se:ere (N = 59)	Overdose effects—100° = dangerous (N = 53)
50° or more:				
OTC drugs	Personal experience. FDA or government approval.	Personal experience.	No consensus.	Drug specificity. Deliberate overdosing.
Rx drugs	Physician selection. If used properly. Personal experience.	Personal experience. Physician selection.	Personal experience. High drug potency.	High drug potency.
Less than 50°:				
OTC drugs	Lack of ability to choose. Differential physiological responses.	Low potency. Differential effects.	Personal experience. Low drug potency.	Low drug potency.
Rx drugs	Lack of testing. Potential for addiction.	Personal experience.	Personal experience. High drug potency.	If used properly.

a lack of knowledge, allergies, and numerous specific side effects. Several respondents who rated Rx drugs high on on safety and effectiveness noted that the safety and effectiveness of prescription drugs are related to the physician's ability to choose the appropriate drug and properly prescribe its use. Respondents who rated OTC drugs as ineffective stated that they did so because the drugs were weak and could not be all things to all people. Respondents who indicated that the overdose effects of OTC drugs were dangerous supported their opinions by citing difficulties with specific drugs—stating that some drugs are more dangerous than others—and by mentioning the increased danger associated with thinking that more is better.

The relationship between respondents' perceptions of a drug's safety and effectiveness and drug use was examined by two-way analysis of variance. The results showed that perceptions of the safety and effectiveness of OTC drugs were related to their use.

Source	Degrees of freedom	Mean square	F ratio	Probability
Safety	2	95.75	7.24	0.001
Effectiveness	2	133.55	10.09	.001
Safety-effectiveness interaction	4	79.85	6.03	.001
Error	191	13.24	....	....

The mean scores that were significant ($P \leq 0.05$) for OTC drug use are shown in table 3. Respondents who rated OTC drugs the highest on safety and the lowest on effectiveness took OTC drugs the most—12.7 times in the 2 days preceding the interview. The interaction between the perception that a drug offered the greatest safety and the perception that the drug was moderately effective resulted in 90 percent lower drug use, or use 1.3 times in the 2 days preceding the interview. Respondents who perceived OTC drugs as unsafe and ineffective had used them at a relatively high rate in the 2 days preceding the interview—3.5 times.

Table 3. Respondents' mean scores for nonprescription drug use by their ratings of these drugs on effectiveness and safety

Effectiveness ratings	Safety ratings: Unsafe (0°–33°)	Somewhat safe (34°–66°)	Safe (67°–100°)	Mean for row
Ineffective (0°–33°)	3.47	1.46	12.67	3.51
Somewhat effective (34°–66°)	1.33	2.00	1.29	1.79
Effective (67°–100°)	1.40	2.50	2.00	2.14
Mean for column ...	2.70	2.03	2.22	2.18

The results of the analysis of variance to identify relationships between the respondents' perceptions of the safety and effectiveness of Rx drugs and Rx drug use are as follows.

Source	Degrees of freedom	Mean square	F ratio	Probability
Safety	2	12.61	3.33	0.038
Effectiveness	2	1.20	.32	.730
Safety-effectiveness interaction	4	6.44	1.70	.152
Error	191	3.79	...	...

The mean scores for Rx drug use are presented in table 4. Respondents who perceived drugs as unsafe used 60 percent fewer drugs than respondents who perceived drugs to be somewhat safe or

Table 4. Respondents' mean scores for prescription drug use by their ratings of prescription drugs on effectiveness and safety

Effectiveness ratings	Safety ratings: Unsafe 0°–33°	Somewhat safe 34°–66°	Safe 67°–100°	Mean for row
Ineffective (0°–33°)	0	5.00	0	2.00
Somewhat effective (34°–66°)	1.00	1.00	1.00	1.00
Effective (67°–100°)	.43	1.09	1.20	1.14
Mean for column ...	0.45	1.15	1.16	1.12

safe. Relationships between respondents' perceptions of the side effects and overdose effects of OTC and Rx drugs and drug use were also examined in two-way analyses of variance, but none of the results met the required 0.05 level of significance.

Differences in the respondents' sex, age, and education were examined in relation to each of the eight measures of consumers' perceptions. *T*-tests provided no evidence that the mean measures of drug safety, effectiveness, side effects or accidental overdoses effects were a function of sex for either OTC or Rx drugs. Because data on age and education were grouped,, two-way analyses of variance were calculated to examine the relationships between these two variables and the measures of drug perceptions. The results did not indicate that age and education were significantly related to the respondents' perceptions about drugs.

Conclusion

The results of this study support the conclusion that perceptions of the safety of OTC drugs and of Rx drugs are different. The study shows that consumers continue to perceive Rx drugs as safer than OTC drugs. The respondents' perceptions of drug safety appear to represent, at least in part, confiidence ratings: confidence in their physician's ability to select and monitor drug regimes, confidence in the FDA's ability to monitor drug offerings, and confidence in self-medication. One respondent stated, "A prescription drug is as safe as the doctor." This comment was interpreted to mean that a prescription drug is as safe as the physician is knowledgeable and precise in prescribing and regulating drug regimens. Respondents demonstrated greater confidence in their physician's ability to prescribe a high-potency drug than in their own ability to self-medicate a low-potency drug. These results add a new dimension to the previously mentioned FDA studies.

There are no benchmark data with which to compare consumers' perceptions of the effectiveness, side effects, and overdose effects of drugs. Respondents in this study rated OTC drugs as less effective than Rx drugs. Their personal experience apparently determined their perceptions of drugs. Since typically OTC drugs are less potent than Rx drugs, the less effective ratings that respondents assigned to them seem warranted.

The side effects of both Rx and OTC drugs were perceived by the respondents to be somewhat severe. Once again, respondents based their ratings in part on personal experience. Since the more powerful Rx drugs have a higher potential for producing serious side effects than do OTC drugs, the similar ratings given Rx and OTC drugs on this characteristic seem inappropriate.

Respondents rated the overdose effects from Rx drugs as slightly more dangerous than those from OTC drugs, with the means for both falling midway between "somewhat dangerous" and "dangerous." The respondents apparently underrated the relative potency of Rx drugs and failed to take account of the potential problems that might arise from their misuse.

The lack of a relationship between the respondents' perceptions of drugs and the respondents' demographic characteristics, such as age, is interesting, especially in view of their frequent inclusion of personal experience as a reason for specific ratings. However, young respondents may have based their judgment on wide experience with drug use, an inventory of childhood experiences, the experience of others close to them, or some combination of these experiences.

The respondents' perceptions of safety and effectiveness as they relate to self-medication are disconcerting. Since the respondents who rated OTC drugs as safe but ineffective were frequent users of these drugs, they may have been engaged in improper drug treatment. Because they considered OTC drugs to be ineffective and at the same time believed themselves to be at low risk from them, these respondents may have increased the frequency of dosage to increase the drugs' power. To the extent that they were overmedicating, they were overspending and also may have been putting their health in jeopardy. Usage rates were much lower if the respondents perceived OTC drugs as being effective but unsafe (1.40 compared with 12.67). The high use among respondents who rated OTC drugs as unsafe and ineffective seems illogical; the

symptoms of these respondents must have been troublesome indeed. This result again reflects economic waste, physical risk, or some combination of both.

Respondents who rated Rx drugs unsafe used Rx drugs less than half as frequently as those who rated them somewhat safe or safe. It is not known whether the lower rate of use was due to drug defaulting or reduced morbidity. It may be that the respondents who viewed Rx drugs as safe requested more medication from physicians.

Implications

Clearly some respondents are making decisions about drug treatment based on inaccurate or inappropriate information rather than relying on traditionally acceptable sources of information such as physicians, pharmacists, and drug labels. The effects of the Tylenol tampering may serve to reduce even further consumers' perceptions of the safety of OTC drugs. The consequences of inappropriate drug treatment are economic waste from reduced productivity, lost wages, and excessive drug and hospital bills and physical discomfort associated with over- or under-medication. As the cost of personal medical care increases, the problems associated with self-medication may well be exacerbated.

Teaching consumers about drugs and their appropriate use is complex. Staelin (*19*) investigated the relationship between consumers' knowledge of a product and use of the product and concluded that it cannot be assumed that increased knowledge of product safety will result in safer use of products. Part of the difficulty is in understanding the relationship between knowledge and behavior. Another difficulty is in evaluating experimental consumer education programs (*20*). Consumer information programs need to be designed so that meaningful results can be incorporated into public policy. In any event, the processing of consumer information and the relationship of that processing to drug use need further study.

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