

NEUTRALIZING CAPACITY OF ANTACID PRODUCTS

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Antacids are used for the relief of upper gastrointestinal distress commonly called heartburn, indigestion, or sour stomach (1). Numerous non-prescription products are sold to counteract this discomfort. Some television commercials demonstrate how more acid is neutralized by one brand of antacid than another.

Antacids are compounded to provide rapid neutralization, extended neutralization, or both (1). Thus antacids are formulated from a variety of materials, including sodium bicarbonate, calcium carbonate, and aluminum and magnesium hydroxide. They are packaged in varying potencies as liquids, gels, tablets, powders, granules, and even as chewing gum. Some antacids contain other ingredients, the most common is simethicone, an anti-flatulent. A detailed description of antacids and their action is published in the Handbook of Non-prescription Drugs (1).

This Bulletin reports a survey of the neutralizing capacity of non-prescription antacid products.

Methods

During April, 1983 inspectors of the Drug Division of the Connecticut Department of Consumer Protection collected fifty-one antacids at retail stores. Twenty were liquids or gels and 31 were tablets, powders, or granules.

Neutralizing capacity expressed as milliequivalents (meq) of active ingredient was determined by methods described in the United States Pharmacopeia (2). Liquids, gels, and powders were analyzed as received. Tablets and granules were ground before testing, and gums were frozen in liquid nitrogen and ground while frozen. Seven samples analyzed in duplicate showed an average difference of 0.21 meq between duplicates with a standard deviation about the mean of 0.21 meq.

Results and Discussion

In Table I we show the active ingredients listed on the label. Among 31 tablets, powders, and granules, 16 contained either aluminum or magnesium hydroxide, or both. Five contained only calcium carbonate, and 8 contained sodium bicarbonate. All liquids and gels except sample 45 contained aluminum or magnesium hydroxide, or both.

The neutralizing capacity of the antacids, expressed as meq (milliequivalents) per minimum dose of tablets, teaspoons or capfuls is shown in Table I. The average meq was 17.2 for tablets, powders and granules and 20.4 for liquids.

The neutralizing capacity of the minimum recommended dose of one product may be compared with the minimum recommended dose of another. For example, two tablets of sample 2 contain about the same neutralizing capacity of two tablets of sample 1. Therefore the two tablet minimum recommended dose of sample 1 has about twice the meq as the one tablet minimum recommended dose of sample 2. Among the liquids, for example, the one teaspoon recommended dose of sample 43 had about 13 meq of neutralizing capacity and the two teaspoons minimum recommended dose of sample 33 about 27 meq. By this standard two teaspoons of sample 43 would equal the two teaspoon minimum recommended dose of sample 33.

The meq per gram of product may also be compared. This places all products on an equal weight basis. For tablets, powders, and granules the average was 10.0 meq per gram and the range from 1.4 to 21.7. For example, a gram of sample 5 with about 22 meq has about four times the neutralizing capacity of one gram of sample 8 with 4.6 meq.

Table 1. Neutralizing capacity of antacid products.

Sample number	Brand and ingredients	Recomm. minimum dose ^b	meq per minimum dose	meq per gram
Tablets, powders, and granules				
1	Algemol; Al & Mg hydroxide ^a	2 tab ^c	20.7	6.5
2	Alka 2; calcium carbonate	1 tab	9.0	6.4
3	Alka Seltzer; aspirin, sodium bicarbonate, citric acid	2 tab	27.6	4.0
4	Amitone; calcium carbonate	2 tab	13.3	7.4
5	Amphojel; Al hydroxide	1 tab	20.9	21.7
6	Brioschi; sodium bicarbonate	1 cap	13.3	1.4
7	Bromo Seltzer; acetaminophen, sodium bicarbonate	¾ cap	16.7	3.7
8	Chooz; calcium carbonate	1 tab	10.7	4.6
9	CVS Antacid + Simethicone ^d ; Al & Mg hydroxide	2 tab	24.7	9.9
10	CVS Anti-Gas Antacid; Mg carbonate, Al & Mg hydroxide, simethicone	2 tab	20.9	12.1
11	CVS Sodium Bicarbonate; sodium bicarbonate	¼ tsp	10.0	10.0
12	CVS Soda Mint; sodium bicarbonate	2 tab	4.2	5.9
13	DiGel; Al & Mg hydroxide	2 tab	20.9	13.8
14	Gelusil; Al & Mg hydroxide	2 tab	24.7	10.6
15	Genovese Antacid + Simethicone; Al & Mg hydroxide	2 tab	25.3	10.1
16	LoSal; Al & Mg hydroxide, calcium carbonate	1 tab	12.4	9.7
17	Maalox #1; Al & Mg hydroxide	2 tab	24.3	21.2
18	Maalox #2; Al & Mg hydroxide	1 tab	24.7	20.6
19	Maalox + Simethicone; Al & Mg hydroxide	2 tab	24.3	10.5
20	Medi Mart Bicarbonate of Soda; sodium bicarbonate	¼ tsp	10.0	10.0
21	Medi Mart Magnesia; Mg hydroxide	4 tab	43.2	17.5
22	Mylanta; Al & Mg hydroxide	1 tab	11.8	12.5
23	Pepto Bismol; bismuth subsalicylate	2 tab	14.6	6.3
24	Phillips Milk of Magnesia; Mg hydroxide	2 tab	20.9	17.9
25	Riopan Chew; magaldrate ^e	1 tab	11.3	9.4
26	Rite Aid Bicarbonate of Soda; sodium bicarbonate	¼ tsp	10.0	10.0
27	Rite Aid Soda Mint; sodium bicarbonate	2 tab	3.5	5.0
28	Rolaids; dihydroxyaluminum sodium carbonate	1 tab	6.0	10.2
29	Tempo Antacid; Al & Mg hydroxide, simethicone	1 tab	15.2	5.6
30	Tums; calcium carbonate	1 tab	9.8	7.5
31	Tums E-X; calcium carbonate	2 tab	28.9	7.4
Liquid and gels				
32	Amphojel; Al hydroxide	2 tsp	21.7	2.0
33	CVS Antacid; Al & Mg hydroxide	2 tsp	26.5	2.6
34	CVS Antacid + Simethicone; Al & Mg hydroxide	1 tsp	12.7	2.6
35	DiGel; Al & Mg hydroxide	2 tsp	23.3	2.5
36	Gavimor Antacid; Al hydroxide, Mg carbonate	1 tbsp	14.7	1.0
37	Gelusil; Al & Mg hydroxide	2 tsp	23.1	2.3
38	Genovese Maldroxal; Al & Mg hydroxide	2 tsp	26.8	2.8
39	Genovese Antacid + Simethicone; Al & Mg hydroxide	1 tsp	12.4	2.7
40	Maalox; Al & Mg hydroxide	2 tsp	27.8	2.9
41	Maalox Plus; Al & Mg hydroxide, simethicone	2 tsp	28.4	2.8
42	Medi Mart Antacid; Al & Mg hydroxide	2 tsp	27.6	2.9
43	Mylanta; Al & Mg hydroxide, simethicone	1 tsp	12.5	2.7
44	Mylanta II; Al & Mg hydroxide, simethicone	1 tsp	26.6	5.5
45	Pepto Bismol; bismuth subsalicylate	2 tbsp	9.6	0.4
46	Phillips Milk of Magnesia ^f	1 tsp	14.3	3.0
47	Riopan; magaldrate	1 tsp	14.7	2.7
48	Riopan Plus; magaldrate, simethicone	1 tsp	14.6	2.9
49	Rite Aid Antacid; Al & Mg hydroxide	2 tsp	30.1	3.1
50	Rite Aid Antacid + Simethicone; Al & Mg hydroxide	1 tsp	12.6	2.7
51	Shop Rite Antacid; Al & Mg hydroxide	2 tsp	27.3	2.8

^aAl is aluminum, Mg is magnesium

^bIn many cases a range is given in the directions on the label. For example, 2 to 4 tablets or 1 to 2 teaspoons. We used the lower as the minimum recommended dose.

^ctab is tablets, tsp is teaspoons, tbsp is tablespoons

^dSimethicone is a gastric defoaming agent used to break or coalesce gas bubbles. It has no activity as an antacid (1).

^eMagaldrate is a chemical combination of aluminum and magnesium hydroxide.

^fNo ingredients listed on label, but milk of magnesia is magnesium hydroxide.

Among the liquids and gels the average was 2.6 meq per gram of liquid with a range of 0.4 to 5.5 meq. Only three liquid samples differed markedly from the average: sample 44 was higher and samples 36 and 45 were lower. On the average, a gram of the liquids and gels had about 74% less neutralizing capacity than the dry tablets, powders, and granules.

Conclusions

Fifty-one samples of antacid tablets, liquids, gels, powders, and granules were analyzed for acid neutralizing capacity, the milliequivalents per minimum recommended dose and per gram of product. The meq per gram of

product sold ranged from 1.3 to 22 in tablets, powders, and granules and from 0.4 to 5.5 in liquids and gels.

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References

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2. United States Pharmacopeia, 19th revision. United States Pharmacopeial Convention, Inc., Rockville, MD.