ORIGINAL ARTICLE

Effect of Preoperative Ingestion of Orange Juice on pH and Volume of Gastric Contents

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ABSTRACT

Objective: To establish the effects of orange juice (pulp free) on residual gastric volume, when it was used during preoperative period till 3 hours before the induction of general anaesthesia.
Method: In this comparative study 150 patients were divided into two groups of 75 each. In the first group patients were kept fasting after midnight, while in other group the patients were allowed 200 ml of standard pulp free orange juice till 3 hours before induction of general anaesthesia. Residual gastric volume was collected from the stomach via an orogastric tube after induction of anaesthesia. Volume was noted and pH measured. Before induction patients were asked about their feeling of thirst and hunger or any other problem. Thirst and hunger were categorized into mild, moderate and severe.
Results: There was no significant difference in volume and pH of residual gastric volume in the two groups. Moreover in group II there was notable reduction in the feeling of thirst and hunger as compared to the fasting group.
Conclusion: Use of orange juice till 3 hours before induction of general anaesthesia does not compromise the safety regarding regurgitation and aspiration, while it considerably reduced the feeling of thirst and hunger from fasting.
Key words: Gastric contents, orange juice, anaesthesia

INRODUCTION

The purpose of preoperative fasting is to minimize the risk of regurgitation and aspiration pneumonitis[1,2], but the duration of fasting to achieve the goal is controversial. To achieve this goal the recommendations on preoperative fasting have varied with time. Until recently the order "nil by mouth after midnight" or 6 hours before anaesthesia induction prevailed. For reasons like alteration in theater schedule the period of preoperative fast is often unduly prolonged and the mean fasting period of around 13 hours is not uncommon[3]. Also this leads to thirst and dehydration in hot climate. The feeling of thirst and hunger is both unpleasant and full of discomfort for the patients especially the children[2,4].

Investigations based on the physiological fact that normal gastric emptying of clear fluids occurs within 2 hours in most patients[5], have changed the trend towards shorter fluid fast which increases patient comfort without compromising the safety. When water was allowed in the preoperative period it was concluded that patients' comfort increased without compromising the safety[6]. Orange juice if used instead of water, is more palatable and therefore more acceptable for the patients. It also provides calories so helps in reducing the feeling of hunger and thirst. The objective of our study was to examine the safety and benefit of preoperative ingestion of pulp free orange juice in patients coming for elective surgical procedures in the light of previous similar studies[7, 8].

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METHOD

After institutional ethical committee approval and informed consent 150 patients were included in the study, which was performed at Services Hospital, Lahore. The patients were divided into two groups. In first group (control) patients fasted overnight for both solids and fluids till the time of surgery. In the second group patients were also fasted overnight as per routine order of NPO after midnight, but were allowed 200 ml of pulp free orange juice (commercial pack of Nestle), about 3 hours before induction of general anaesthesia.

Patients were asked to grade their degree of thirst and hunger just before the induction of anaesthesia. Duration of fast in each case and time of last fluid intake was also noted. Then general anaesthesia was induced, after which an orogastric tube of 18 fr. size was passed by an investigator who was unaware of the fasting status of the patient. After confirming the correct positioning of the orogastric tube by auscultation, the gastric contents were aspirated by a 50 ml syringe by putting the patient in head-up, head-down, right lateral and left lateral positions. Total aspirate was measured in the end, pH of the aspirate was also measured by Merck pH paper, and all finding were recorded.

Patients aged 15-60 years weighing 30-70 kg and of both sexes were included in the study. All patients fell in ASA I or II category. Pregnant patients

and patients suffering from upper gastrointestinal diseases e.g., reflux, hiatus hernia or acid peptic disease were excluded. Patients who were administered opioids, anticholinergics, H_2 blockers and metoclopramide were also excluded.

The data analysis was computed. SPSS was used to analyze mean, standard deviation and range of each variable. Independent sample t-test was applied after fulfilling the normality and equality of population variance assumption. Pearson Chi-square test was used to check the association among different groups of thirst and hunger within two groups. The p-value <0.05 was considered significant.

RESULTS

No demographic differences among patients in two groups were found (Table 1). It emerged from the results of the study that intake of 200 ml of pulp free orange juice till 2 hours before induction of anaesthesia did not make significant change in volume and pH of the gastric residual fluid (Table 2). In group I (control) mean volume of the residual fluid collected just before induction was 26.55±1.70ml, while in group II (study group), it was 26.68±1.70ml. The statistical analysis also showed that there was no significant difference between the two groups, (p-value 0.627)

Table 1: Demographic data of patients in two study groups:

	Group I	Group II	P Value
Number	75	75	
Minimum Age (years)	15	18	0.725
Maximum Age (years)	55	50	
Mean Age (years)	33.1867	32.5733	
Standard Deviation	11.4852	9.7373	
Minimum Weight (kg.)	50	55	0.3752
Maximum Weight (kg.)	70	70	
Mean Weight	63.40	64.066	
Standard Deviation	5.3017	3.7446	
Minimum Height (inches)	62	65	0.875
Maximum Height (inches)	72	71	
Mean Height	68.0933	68.0533	
Standard Deviation	1.8539	1.1843	

The mean pH in group I was 1.63±0.48 and in group II it was 1.59 ± 0.49. Again this difference was not significant statistically as p-value was 0.594 (Table 2). Other important aspect of the study was to note the degree of thirst and hunger as a subjective feeling of patients in control and study groups. It was encouraging to find out that in the study group a significant number of patients i.e., 55 had no feeling of thirst. This was 36.7% of the total patients included in the study, while in control group this number was 18 i.e., 12%. This difference in between the two groups was statistically significant, p-value 0.000. Moreover the degree of thirst in remaining patients of group II was quite low as compared to remaining patients of group I.

Similarly in group II there was no subjective feeling of hunger in 41 patients (27.3%) while in group I this number was 28 (18.7%). The difference was statistically significant (p-value 0.023) (Table 3).The degree of hunger in remaining patients of group II was also lesser as compared to remaining patients of group I. No patients from both groups had complication like regurgitation and aspiration.

Table 2: Gastric volume and pH in two study groups:

	Group I	Group II	P value
Number	75	75	
Gastric Volume (Minimum) ml	23	23	0.627
Gastric Volume (Maximum) ml	30	30	
Mean	26.5467	26.6800	
Standard Deviation	1.6546	1.7018	
pH of Aspirate (Minimum)	1	1	0.594
pH of Aspirate (Maximum)	2.20	2.00	
Mean	1.6293	1.5867	
Standard Deviation	0.4826	0.4957	

Table 3: Subjective feeling of thirst & hunger in 2 study groups:

	Group I	Group II	P value
Number	75	75	
No Thirst	18 (12 %)	55(36.7%)	0.000
Mild Thirst	36 (24 %)	16(10.7%)	
Moderate Thirst	20 (13.3 %)	3 (2 %)	
Severe Thirst	1	1	
No Hunger	28 (18.7 %)	41(27.3%)	0.030
Mild Hunger	32 (21.3 %)	30 (20 %)	
Moderate Hunger	12 (8 %)	3 (2 %)	
Severe Hunger	3 (2 %)	1 (0.7 %)	

DISCUSSION

In 1983, Miller et al. reported no differences in gastric fluid volume and pH in patients who were nothing by mouth after midnight but had tea and toast 2-4 hours before surgery. Similar finding were confirmed by other studies conducted by Maltby et al,, Sutherland et al and Hutchison et al[4, 5].

In 1988 fasting guidelines at Foothills Medical Center in Calgary were changed and only solids were restricted while clear fluids were allowed until 3 hours before the scheduled time of surgery[9]. Clear fluids include water, apple juice, carbonated beverages, clear tea and black coffee. Pulp free orange juice is also taken as clear fluid. Other aspect of preoperative fasting is feeling of thirst and hunger which can be trouble some, and especially disturbing for the children.

In our study we used orange juice because it is freely available, palatable and a good source of energy. Study was conducted to note its effects on volume and pH of gastric fluid, and its efficiency in suppressing thirst and hunger in our conditions. 200 ml of this juice was used because it is considered to be the optimal volume which is expected to pass out of stomach in 2-3 hours[3,4,5].

The results were interesting and almost in confirmation with the previous studies, however, these results did not prove the proposed hypothesis to full extent as the study group had similar fluid volume and pH as was noted in the control group. It means orange juice does not significantly change the volume and pH of residual gastric fluid as compared to complete fasting. Other positive aspect of the results is that orange juice did significantly reduce the subjective feeling of thirst and hunger as compared to fasting group.

Andrew Hutchison et al. compared coffee and orange juice with overnight fast, they found no difference in residual volume of gastric fluid in the both groups. While J. Roger Maltby et al. found that with water as clear fluid there was actually a reduction in residual gastric volume as compared to fasting patients[3, 4].

In our study no significant difference between the pH values of both study groups was found. This is in confirmation with large number of previous studies[10, 11]. Thirst is more disturbing than hunger and orange juice emerged as a good fluid to reduce the sense of thirst. There was a significant difference as far as the feeling of thirst in both groups is concerned. This was also noted in similar fashion by Andrew Hutchison et al[4]. Orange juice is better than other fluids containing greater amount of sugar as the later have been found to increase the feeling of thirst. Very concentrated fluids also empty the stomach more slowly[12].

Feeling of hunger is also trouble some especially for the children. The results of our study showed that significant difference was there in the subjective feeling of hunger in both groups. This feeing is not suppressed by clear water intake as noted by J. Rogar Maltby et al. Other studies in which clear fluids used were coffee, tea or orange juice found to suppress the feeling of hunger[11]. The orange juice used in our study has 48 kcal/100ml.

Fauzia A. Khan concluded in her study that ingestion of 200 ml of water did not compromise the safety of the patients, rather it decreases the patients' thirst and anxiety[2].

American society of anesthesiologists and Canadian anesthesiologists society have given the standard guidelines regarding fasting.

CONCLUSION

The results of this study partially agree with the proposed hypothesis and is concluded that;

1. Preoperative fasting order nil by mouth after midnight, irrespective of the time of surgery should be restricted only to solid foods, and for those where delayed gastric emptying is expected due to any reason or in those having high risk of regurgitation and aspiration due to various factors.

2. Clear fluids should be encouraged and reasonable amount of pulp free orange juice may be recommended to take till 3 hours before induction of anaesthesia. This is to reduced the thirst and hunger resulting from unnecessary fasting. This also decreases the apprehension of the patient.

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