Letter to the Editor

Furazolidone and *Helicobacter pylori* Treatment

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We read with great interest the article published by Hosseini et al.[1] in October issue of Middle East Journal of Digestive Diseases. Briefly, in this article, authors concluded that furazolidone based therapeutic regimens (in moderate and even high-dose) were not preferable for first-line treatment against *H.pylori* infection among the northern population in Iran.[1] Altogether, some points we found may not support their final conclusion.

1- Standard triple therapy is a known formulation for *H.pylori* treatment; however, recent recommendations are indicating unacceptable eradication rates, mostly because of emergence of clarithromycin resistance. As an alternative, authors chose furazolidone and amoxicillin with different dose (high and moderate) as new therapeutic regimen. As such, furazolidone use; especially in shorter duration (7 days) could be attractive for clinicians. Major critic to authors' conclusion is lack of knowledge about antibiotic resistance of *H.pylori*. In other words, authors have no data about antibiotic resistance of amoxicillin and furazolidone among *H.pylori* strains isolated from patients in north of Iran. Thus, combined therapeutic regimens consist of these drugs could not represent an appropriate treatment.

2- Rapid increasing prevalence of antibiotic resistance has called an urgent request to reconsider the established *H.pylori* therapeutic regimens and rethink about newer ones.[2] However, in developed countries the use of furazolidone is highly prohibited due to the its carcinogenic effects.[3,4] Unfortunately, the relatively low cost of this antibiotic led to its frequent use in developing countries such as Iran. Taking together, it seems that using this antibiotic should not be replaced in common drugs in *H.pylori* first line therapy.

In fact, antibiotic regimens for *H.pylori* eradication need to be reconsider before prescribing in clinical practice in area with data from antibiotic susceptibility patterns.

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CONFLICT OF INTEREST

The author declares no conflict of interest related to this work.

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We thank the author of the letter for his attention. We noticed the comments and here with, we have answered all the points.

First of all, we did not conclude that Furazolidone-based regimens are not preferable for first-line therapy in Iran. We just reported that "our triple" Furazolidone-based regimens could not achieve ideal eradication rates and therefore, recommended quadruple Furazolidone-containing regimens. Accordingly, we had also referred to 4 quadruple Furazolidone-containing regimens in the manuscript that could achieve more that 90% eradication rates.

The Answer to Comment 1:

As we had mentioned in the manuscript, the unavailability of *H.pylori* culture was our main limitation. However, we had also referred to a new study performed in north of Iran (Mazandaran) in which the resistance rate to Amoxicillin was 6.8% and also referred to other studies from Iran in which resistance rates to Furazolidone were between 0 to 4.5% (All references are included in the manuscript). Moreover, when we use antibiotics in combination, they will show synergic effects on overcoming the resistance.

On the other hand, the effects of antibiotics *in vivo* are not the same as those observed in vitro, since the antibiotics must diffuse to the gastric mucosal layer where the bacteria reside. Furthermore, recent studies have shown differences in the patterns of resistance among *H.pylori* organisms even when they are isolated from different parts of stomach of the same patient. Therefore, *H.pylori* culture results cannot completely reflect or predict what we will observe in clinical practice.

The Answer to Comment 2:

The carcinogenic effect of Furazolidone is not approved yet. The reference mentioned by the author is too old. In fact, the International Agency for Research on Cancer (IARC) categorizes agents in categories or groups: Group 1: Carcinogenic to humans. Group 2A: Probably carcinogenic to humans (substances for which there is a lesser degree of evidence in humans but sufficient evidence in animal studies, or degrees of evidence considered appropriate to this category, e.g., unequivocal evidence of mutagenicity in mammalian cells), Group 2B: Possibly carcinogenic to humans, (substances for which there is sufficient evidence in animal tests, or degrees of evidence considered appropriate to this category), Group 3: Unclassifiable as to carcinogenicity in humans, Group 4: Probably not carcinogenic to humans. Furazolidone is a category 3 agent.[1] Also other newer studies have not supported the carcinogenic effect of Furazolidone.[2,3]

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