Travel style is a major risk factor for diarrhoea in India: a prospective cohort study

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Abstract

Although some studies suggested specific foods/beverages as risk factors for travellers' diarrhoea (TD), details of transmission remain unclear. We assessed the influence of travel style (luxury/middle-class versus backpacking) on TD risk. TD attack rates were compared in a prospective study among travellers to India at the University of Zurich's Travel Clinic. Information on consumption of foods/beverages was collected. Seventy-one luxury/middle-class travellers and 21 backpackers completed the study; overall 37% suffered from TD (62% backpackers, 30% luxury/middle-class travellers, OR 4.43, p 0.022). Travel style rather than the consumption of specific foods/beverages appears to be a risk factor for TD development.

Keywords: Food hygiene, India, travel style, travel, travellers' diarrhoea

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Introduction

"Boil it, cook it, peel it, or forget it" is standard advice in pre-travel consultations. Although this advice has been propagated for at least 30 years the feasibility of such self-restriction is difficult [1,2]. Several retrospective studies found no association between dietary precautions and a reduced risk of acquiring travellers' diarrhoea (TD) [1,3]. A review by Shlim identified an association between TD and drinking "lassi" or eating reheated food, but no association between TD and traditionally mentioned risk factors such as tap water or ice cubes [1]. A single prospective study found an increased TD risk with higher numbers of dietary mistakes [4], but the response rate was unsatisfactory. Currently, there is no clear evidence for a significant association between dietary precautions and TD. Two studies demonstrated that not the choice of foods, but rather the source of food (i.e. hotel selection) played a pivotal role for developing TD [3,5].

To shed light on the source of pathogens resulting in TD we carried out a prospective cohort study to compare TD attack rates in tourists travelling to India staying in middle/high-class hotels with rates in low-budget travellers/backpackers. We assessed whether individual eating behaviours, food hygiene and other practices had an influence on TD occurrence. India was chosen because it is one of the countries with the highest TD incidence [6].

Methods

Individuals seeking pre-travel advice at the Travel Clinic of the Epidemiology, Biostatistics and Prevention Institute, University of Zurich between October 2013 and April 2014 were invited to participate in this prospective cohort study if they were $\geq$18 years of age and travelled to India for $\leq$30 days. The study was approved by the Zurich Ethics Committee (KEK-ZH-Nr.2013-0337).

Participants signed an informed consent and provided pre-travel information on demographics, medical history and planned travel characteristics. During the trip, they completed a daily questionnaire about consumed foods/beverages as well as diarrhoea and vomiting episodes. Further information detailing diarrhoea episodes and other travel-related behaviour was collected within 1 week after their return.

A sample size of 148 travellers was calculated to demonstrate a 25% higher risk of developing diarrhoea in low-budget travellers compared with luxury/middle-class travellers (80% power, 95% confidence, 20% loss-to-follow-up). A previous

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TABLE 1. Demographics and risk factors according to travel style and according to traveller's diarrhoea

				Travel style			Traveller's diarrhoea									
		All (n = 92)		Backpacking (n = 21)	Luxury/middle-class (n = 71)		No TD (n = 58)	TD (n = 34)								
		n	%	%	%	p-value[a]	%	%	Crude OR	95% CI		p-value[b]	Adjusted OR[c]	95% CI		p-value[b]
Age (years)	18–40	45	48.9	71.4	42.3	0.049	44.8	55.9	1				1			
	41–60	31	33.7	14.3	39.4		39.7	23.5	0.48	0.18	1.29	0.28	0.71	0.23	2.17	0.62
	>60	16	17.4	14.3	18.3		15.5	20.6	1.06	0.34	3.37		1.45	0.36	5.84	
Female		42	45.7	47.6	45.1	0.84	43.1	50.0	1.32	0.56	3.09	0.52				
Nationality	Swiss	70	76.1	76.2	76.1	0.99	77.6	73.5	1							
	other[d]	22	23.9	23.8	23.9		22.4	26.5	1.25	0.47	3.32	0.66				
Country of birth	Switzerland	59	64.1	66.7	63.4	0.73	62.1	67.6	1							
	other[e]	33	35.9	33.3	36.6		37.9	32.4	0.78	0.32	1.91	0.59				
Pre-existing medical condition	healthy	72	78.3	71.4	80.3	0.39	79.3	76.5	1							
	pre-existing disease[f]	20	21.7	28.6	19.7		20.7	23.5	1.18	0.43	3.26	0.75				
Regular medication	yes	16	17.4	19.1	16.9	0.76	15.5	20.6	1.41	0.47	4.21	0.54				
Allergies	yes	30	32.6	38.1	31.0	0.54	29.3	38.2	1.49	0.61	3.65	0.38				
Trip duration (days)	1–14	44	47.8	23.8	54.9	0.012	50.0	44.1	1				1			
	15–30	48	52.2	76.2	45.1		50.0	55.9	1.27	0.54	2.96	0.59	0.85	0.28	2.55	0.78
Companionship	alone	12	13.2	9.5	14.3	0.73	19.3	2.9	1							
	with company	79	86.8	90.5	85.7		80.7	97.1	7.89	0.97	64.14	0.053				
Diarrhoea previous travel	no	44	48.3	38.1	51.4	0.48	50.9	44.1	1							
	yes, once	26	28.6	38.1	25.7		29.8	26.5	1.02	0.37	2.84	0.55				
	yes, several times	21	23.1	23.8	22.9		19.3	29.4	1.76	0.61	5.07					
Diarrhoea of travel companion	yes	36	40.0	50.0	37.2	0.30	24.1	58.3	4.42	1.78	10.97	0.001	4.10	1.55	10.87	0.005
Washing/disinfection of hands	always	24	26.4	19.1	28.6	0.57	24.6	29.4	1.28	0.49	3.32	0.61				
Food from high-class restaurant	yes	82	89.1	71.4	94.4	0.008	91.4	85.3	0.55	0.15	2.05	0.37				
Food from the street	yes	41	44.6	81.0	33.8	<0.001	44.8	44.1	0.97	0.41	2.28	0.95				
Ice cubes	yes	27	29.4	19.1	32.4	0.29	25.9	35.3	1.56	0.63	3.91	0.34				
Travel style	backpacking	21	22.8	—	—	—	13.8	38.2	3.87	1.40	10.70	0.009	4.43	1.25	15.75	0.022
	luxury/middle-class	71	77.2	—	—		86.2	61.8	1				1			

OR-Odds ratio, CI-confidence interval, TD-traveller's diarrhoea, ORs were obtained using logistic regression.
[a]Chi-squared or Fisher's exact test as appropriate.
[b]Wald test or likelihood ratio test as appropriate.
[c]Adjusted for travel style, age, travel duration, diarrhoea of travel companion.
[d]Other including Germany (n = 13), Italy (n = 3), Finland (n = 1), Hungary (n = 2), Uruguay (n = 1), Japan (n = 1), Colombia (n = 1).
[e]Other including Germany (n = 16), Denmark (n = 1), Macedonia (n = 1), Italy (n = 3), Peru (n = 1), England (n = 1), Serbia (n = 1), Finland (n = 1), Hungary (n = 2), India (n = 1), Portugal (n = 1), Uruguay (n = 1), Bahrain (n = 1), Japan (n = 1), Columbia (n = 1).
[f]Pre-existing disease including cardiovascular disease (n = 7), psychiatric disease (n = 5), irritable bowel syndrome (n = 1), hypothyroidism (n = 1), vitiligo (n = 1), st. p. hepatitis A (n = 1), st. p. jaundice of unknown aetiology (n = 1), st. p. pulmonary embolism (n = 1), st. p. breast cancer (n = 1), benign prostate hyperplasia (n = 1).