

Travel-Related Diseases and Injuries in Children and Adolescents: A Post-Travel Surveillance Questionnaire Assessment



Doenças e Lesões Relacionadas com Viagens em Crianças e Adolescentes: Avaliação com Base num Questionário de Vigilância Pós-Viagem

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ABSTRACT

Introduction: Children and adolescents are a relevant and increasing proportion of travelers. Injuries and infectious diseases in children are safety concerns when traveling. However, data on diseases and injuries during international travels in children are not available. The aims of this study were to analyze travel-related diseases and injuries among pediatric travelers during and after international trips, to identify risk factors for travel-associated disease, and to evaluate the compliance and effectiveness of the recommendations provided in pre-travel appointments.

Material and Methods: We enrolled travelers aged under 18 years attending a pre-travel clinic, in a tertiary hospital (2017 - 2019); 223 of the 370 pediatric travelers attending the pre-travel clinic were included. The study was based on a questionnaire designed to address health and safety issues – vaccines and chemoprophylaxis, including side effects, the occurrence of disease or injury, diagnosis, treatment, and outcomes.

Results: The median age at pre-travel evaluation was eight years; 39.7% of the travelers were adolescents, 52.5% were female. The participants traveled to 40 countries across four continents, with a median travel duration of 14.5 days. Asia was the most visited continent. Traveling was safe for 84.8%. From 34 travelers who had illness/injury, gastrointestinal symptoms were elicited in 41.2%. Sixteen (47.1%) travelers required an urgent medical appointment at the destination, and no one was hospitalized. Destinations in Africa and longer trips were significantly associated with a higher occurrence of disease/injury ($p = 0.023$ and $p < 0.001$, respectively). In a multivariable model, traveling to Africa was still significantly associated with travel-related disease/injury [OR = 2.736 (1.037 - 7.234)].

Conclusion: Disease/injury occurred in 15.2% of pediatric travelers. Even though 47.1% of the travelers required an urgent medical appointment, the developed conditions were not severe enough to warrant hospitalization. Travels to Africa and longer trips seem to be associated with a higher risk of disease and injury.

Keywords: Accident; Adolescent; Child; Disease; Travel; Travel-Related Illness; Wounds and Injuries

RESUMO

Introdução: As crianças e adolescentes representam uma proporção relevante e crescente de viajantes. As doenças infecciosas e as lesões em crianças durante viagens internacionais são motivo de preocupação relacionada com segurança; no entanto, os dados na idade pediátrica são amplamente desconhecidos. Os objetivos deste estudo foram analisar as doenças e lesões relacionadas com as viagens ocorridas em viajantes em idade pediátrica, durante e após viagens internacionais, identificar fatores de risco para a ocorrência de doenças associadas à viagem, e avaliar o cumprimento e a eficácia das recomendações fornecidas na consulta pré-viagem.

Material e Métodos: Incluímos viajantes com idade inferior a 18 anos avaliados na consulta do viajante num hospital terciário (2017 - 2019). O estudo baseou-se num questionário, desenhado para abordar questões de saúde e segurança – vacinas e quimioprofilaxia, incluindo efeitos colaterais, ocorrência de doença ou lesão, diagnóstico, tratamento e resultado.

Resultados: Foram incluídos 223 dos 370 viajantes pediátricos observados na consulta do viajante. A mediana da idade à data da consulta era oito anos, 39,7% eram adolescentes e 52,5% eram do sexo feminino. Os participantes viajaram para 40 países, em quatro continentes, e a mediana da duração da viagem foi 14,5 dias. O continente asiático foi o mais visitado. A viagem foi segura em 84,8% dos casos. Nos 34 viajantes que apresentaram doença/lesão, verificaram-se sintomas gastrointestinais em 41,2%. Dezanove (47,1%) viajantes necessitaram de consulta médica urgente no destino e nenhum foi hospitalizado. Destinos em África e viagens mais longas foram associados, significativamente, a maior ocorrência de doença/lesão ($p = 0,023$ e $p < 0,001$, respetivamente). No modelo multivariável, viajar para África foi associado, significativamente, a doença/lesão [OR = 2,736 (1,037 - 7,234)].

Conclusão: A viagem associou-se a doença/lesão em 15,2% dos viajantes pediátricos. Embora não requerendo hospitalização, 47,1% dos viajantes necessitaram de consulta médica urgente. África e viagens mais longas parecem estar associados a risco maior de doenças/lesões.

Palavras-chave: Acidentes; Adolescente; Criança; Doença; Doença Relacionada a Viagens; Ferimentos e Lesões; Viagem

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INTRODUCTION

Before the COVID-19 pandemic, international travel was increasing worldwide, with a significant proportion of pediatric travelers. According to data from the World Tourism Organization, international tourist arrivals increased 5% in 2018 to reach the 1.4 billion mark.¹ Over the last few years, in line with a global trend, the number of families traveling with their children to tropical destinations has also increased.² Although the estimates of the number of children traveling internationally are limited, data from the United States reported that, in 2000, 7% of travelers (1.9 million) were children.^{3,4} More recent data estimated that 2.4 million children, from the United States, travel internationally each year, and this number is increasing.⁵

Children traveling overseas are exposed to the possibility of a wide spectrum of diseases of distinct severity.^{2,6} The evaluation of the profile of travel-associated diseases may help healthcare providers to prepare families to travel safely while contributing to the prevention, control, and treatment of these conditions, among international travelers. Car crashes, drowning, water-related illnesses, and injuries are some examples of relevant concerns in children who travel abroad. The prevention of these situations can be considered during pre-travel appointments.⁵

Surveillance of travel-related morbidity is an essential component of global public health since travelers can contribute to the global spread of infectious diseases.^{7,8} Data on morbidity, during and after international travel, in the pediatric age are scarce.⁹ To the best of our best knowledge, the Portuguese pediatric traveler population has never been evaluated in this setting.

In this study, we analyzed travel-related diseases and injuries among pediatric travelers, during and after international trips, considering the demographics of travelers, travel destination and duration, travel-related health care events, and health care needs. Our aim was to identify the travel destinations with higher risk of morbidity as well as other risk factors. Another study aim was also to evaluate the compliance and effectiveness of the recommendations provided in pre-travel appointments. Overall, the main objective of the study was to collect real-world data on the context of pediatric travel.

MATERIAL AND METHODS

This observational retrospective study was based on the application of a questionnaire through a telephone call. The 21-item questionnaire (on travel-related disease or injury) was made available to all travelers younger than 18 years old that were evaluated in our pre-travel clinic, from January 2017 to December 2019. The questionnaire was applied between April and July 2020, which is more than one month after the travelers returned. It was answered by the child's parents, caregivers or by the adolescents, when older than 18 years old, by the time of the phone call. The questionnaire (https://www.actamedicaportuguesa.com/revista/index.php/amp/article/view/16782/Appendix_01.pdf) comprised: 1. demographic data; 2. country or countries visited;

3. travel length; 4. type of accommodation (hotel and other than hotel); 5. compliance with recommendations provided in the travel clinic; 6. reason for non-compliance; 7. adverse effects attributed to prophylaxis; 8. disease, accident, fall or bite during travel (including the timing of occurrence); 9. sickness duration; 10. health care use, diagnosis, treatment, and hospitalization (including hospitalization length); 11. need to anticipate the return; 12. symptoms that were presumed to be related with travel and respective sequelae. Travelers who could not be contacted after three call attempts, refused to provide information, traveled for immigration reasons, or those that did not travel were excluded (Fig. 1). In the scope of this study, the abrupt harm or damage caused by external agents, including accidents, falls, animal bites, burns, fractures, sprains, and strains was classified as injury. The pathological processes characterized by an identifiable group of signs, symptoms, or both was classified as medical disease.

Categorical variables were described as absolute frequencies (n) and relative frequencies (%). Median and percentiles were used for continuous variables. For continuous variables, the nonparametric tests Mann-Whitney or independent-sample *t*-test were used when appropriate, considering normality assumptions. In the case of categorical variables, the chi-square test and the Fisher's exact test were used, as appropriate. Logistic regression was used to determine the relationship between travel-related disease or injury and some demographic, clinical, or travel variables. All variables with $p < 0.20$, in the univariate analysis, were included in the final model. The significance level used was 0.05. Statistical analysis was performed using the software Statistical Package for the Social Sciences v. 27.0.

The study was approved by the Ethics Committee of the São João Hospital (Clinical research project no. 174/18, 12.07.2019).

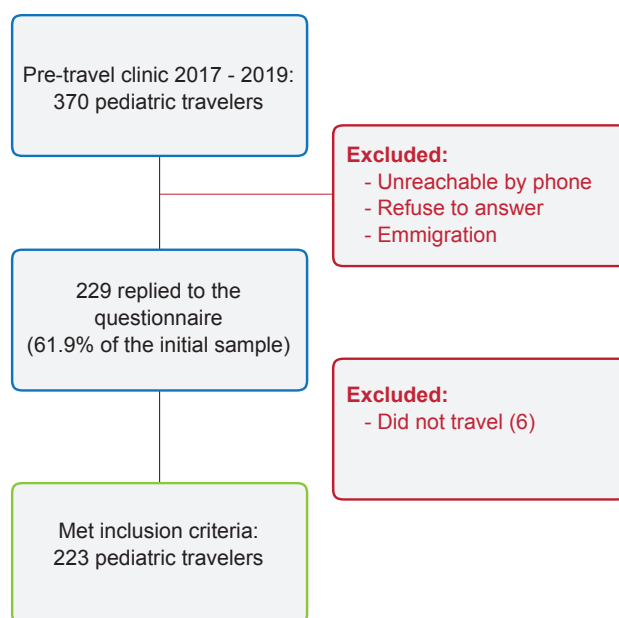


Figure 1 – Population study outline

RESULTS

Characteristics of pediatric travelers

In the period under review, we performed 5294 pretravel consultations at our travel clinic. Of these, 370 (7%) were related with pediatric travelers. The questionnaire was applied to 223 pediatric travelers. The remaining 147 travelers were excluded from the study in accordance with the exclusion criteria (see Material and Methods). In 215 cases (96.4%), the questionnaire respondent was an adult (parent or caregiver).

The demographic characteristics of the included cases (n = 223), travel issues and countries of destination are depicted in Table 1.

Prophylaxis

In the setting of pre-travel advice, 183 (82.1%) children/adolescents were vaccinated as detailed in Table 2.

Malaria chemoprophylaxis was recommended in 73 cases (32.7%). Nevertheless, 12 (16.4%) travelers did not comply with chemoprophylaxis and admitted to missing doses. There were no cases of malaria among our cohort.

Disease, accidents, falls or bites during travel

Thirty-four (15.2%) travelers reported diseases, accidents, falls, or bites during travel. The remaining 189 (84.8%) did not present any event of disease or injury. The detailed reported events are summarized in Table 3.

Table 1 – Demographic features and travel characterization

Gender, n (%)		
Male	106	(47.5)
Female	117	(52.5)
Age at pre-travel consultation, minimum (months)	2	
Age at pre-travel consultation (years), median (p25 - p75)	8	(3 - 14)
Age at pre-travel consultation (years), n (%)		
< 1 year	8	(3.7)
1 - 5 years	69	(31.5)
6 - 10 years	55	(25.1)
11 - 18 years	87	(39.7)
Without information	4	
Time between pre-travel consultation and travel (week), median (p25 - p75)	3	(1 - 5)
Number of countries visited, per traveler, n (%)		
1	178	(79.8)
≥ 2	45	(20.2)
Number of countries visited	40	
Continents and regions of destination		
Asia [East Asia (16), South Asia (22), Southeast Asia (65), West Asia (9)]	112	(38.8)
Africa [Sub-Saharan Africa (89)]	90	(31.1)
South America	66	(22.8)
North America	16	(5.5)
Europe	5	(1.7)
Travel length (days), median (p25 - p75)	14.5	(9 - 23)
Travel length (days), n (%)		
< 1 week	22	(9.9)
1 - 3 weeks	140	(63.1)
> 3 weeks	60	(27.0)
Without information	1	
Type of accommodation, n (%)		
Hotel	130	(58.3)
Family or friends' home	74	(33.2)
Own/company home	10	(4.5)
Hostel or similar	8	(3.6)
Camping	1	(0.4)

Table 2 – Vaccines and adverse reactions (when reported, in children and adolescents who received the vaccine)

Routine vaccine	n (%)
Meningococcal A, C, W, Y conjugate (n = 170)	9 (5.3)
Myalgia	1/9 (11.1)
Measles/ Mumps/ Rubeola (anticipation of National Vaccine Plan) (n = 179)	6 (3.4)
Fever	1/6 (16.7)
Travel vaccines	
Japanese encephalitis (n = 179)	4 (2.2)
Myalgia	1/4 (25.0)
Hepatitis A (n = 179)	121 (67.6)
Fever	1/121 (0.8)
Local pain	1/121 (0.8)
Yellow fever (n = 179)	95 (53.1)
Fever	1/95 (1.1)
Local pain	1/95 (1.1)
Typhoid fever (n = 179)	59 (33.0)
Myalgia	1/59 (1.7)

Table 3 – Events while traveling (n = 34)

Gender, n (%)	
Male	14 (41.2)
Female	20 (58.8)
Age (years), median (p25 - p75)	8 (1 - 11)
Timing of occurrence, median (p25 - p75)	7 (7 - 15)
Seeking medical care during travel, n (%)	
Yes	16 (47.1)
No	18 (52.9)
Specific treatment during travel n (%)	
Antimicrobial agents	5 (62.5)
Topical antifungal	1 (12.5)
Symptomatic treatment	2 (25.0)
Hospitalization during the travel, n (%)	0 (0.0)
Medical disease, n (%)	
Nausea, vomiting, or diarrhea	14 (41.2)
Fever, unspecified	4 (11.8)
Conjunctivitis	3 (8.8)
Tonsillitis	2 (5.9)
Typhoid fever	1 (2.9)
Food poisoning	1 (2.9)
Flu (Influenza A)	1 (2.9)
Urinary infection	1 (2.9)
Chickenpox	1 (2.9)
Ringworm	1 (2.9)
Skin infection, unspecified	1 (2.9)
Sickness duration (days), median (p25 - p75)	4 (3-5)
Injury, n (%)	
Insect bite	2 (5.9)
Needlestick injury	1 (2.9)
Sunburn	1 (2.9)

Regarding the occurrence of diseases/accidents, younger children (up to 10 years old) reported more events (25/132; 18.9%) compared with older ones (8/87; 9.2%) ($p = 0.075$).

Two (0.9%) travelers reported symptoms after returning; one had diarrhea and the other hand-foot-mouth disease. No sequelae were reported.

Risk factor analysis for travel-associated disease among children

In an inferential analysis, the continent of destination Africa and longer trips were significantly associated with a higher occurrence of disease events ($p = 0.023$ and $p < 0.001$, respectively). However, in a multivariable model, only traveling to Africa was significantly associated with disease while traveling (OR = 2.736; 1.037 - 7.234) (Table 4). There was a positive association between children traveling to Africa and the risk of travel-related diseases and injuries, after adjusting for the selected factors (Table 4). Pediatric travelers to Africa stayed more often in non-hotel accommodations (friends or family houses, hostels or camping) compared with travelers to Asia (52.1% vs 10.9%; $p < 0.001$). The median length of Africa travels was not significantly different from those to Asia or other continents ($p = 0.826$). The median age of travelers was nine years (p25p75: 4 - 14) for trips to Africa, 10 years (p25p75: 7 - 15) for trips to Asia, and 5.5 years (p25p75: 1 - 11) for trips to other continents; ($p < 0.01$).

DISCUSSION

The pretravel clinic is an important opportunity to provide preventive advice to pediatric travelers. However, assessing travelers after their return remains necessary to analyze in detail all traveling events as well as the developed

conditions.

In this setting, we investigated, for a period of three years, the demographic features, travel characteristics, health care use, and travel-related morbidity of 223 children and adolescents that traveled abroad. In the studied period, children/adolescent travelers corresponded to 7% of all pretravel appointments carried out at our hospital. This is a relevant number of a specific group of travelers, with particularities and specific needs that are distinct from those of adults.³

In our sample, gender distribution was balanced, and eight children were less than one year of age. The median time interval between the pretravel consultation and the trip was three weeks, which is slightly less than the recommended period of four-six weeks before traveling, proposed by the Centers for Disease Control and Prevention.¹⁰

About 20% of the included children traveled to more than one location, with additional preventive measures in travel planning and safety, in accordance with the different destinations. Participants traveled to four different continents, with a high percentage of pediatric travels to Asia and Africa.

Most travelers were accommodated in hotels, but around one-third stayed at other kinds of local accommodations: family or friends ($n = 74$), own house/company ($n = 10$), hostels ($n = 8$) or camping ($n = 1$). Staying in the house of local people, including family, may be associated with less compliance with travel advice and prophylaxis. This can be related with overlooking the recommendations by locals or to different beliefs, and can result in increased infectious risk.^{11,12} It is, in fact, common that travelers who visit family and friends abroad acquire their beliefs and accept their suggestions on disregarding pretravel medical advice.

The high rate of vaccinated travelers ($n = 183$) and the

Table 4 – Risk factors associated with disease during travel

Regression	Disease during travel			Multivariable logistic model ⁴		
	Yes* (n = 34)	No (n = 189)	p-value	OR	95% CI	p-value
Age (years); mean (SD)	7 (5)	9 (6)	0.211 ¹			
Gender, n (%)						
Male	14 (41.2)	92 (48.7)	0.420 ²			
Time between consultation and travel (weeks); median (IQR)	4 (2 - 7)	3 (1 - 5)	0.070 ³	0.988	0.930 - 1.050	0.706
Destination, n (%)			0.033 ²			
Africa	17 (50.0)	54 (28.6)		2.739	1.037 - 7.234	0.042
Asia	9 (26.5)	55 (29.1)		2.159	0.765 - 6.092	0.146
Other	8 (23.5)	80 (42.3)		Ref		
Accommodation, n (%)						
Non-hotel**	17 (50.0)	76 (40.2)	0.287 ²			
Travel duration (days); median (IQR)	22.5 (14.0 - 37.5)	14 (8 - 21)	< 0.001 ³	1.020	0.988 - 1.042	0.080

*: yes included disease/accident/ occurrence

** : family and friends, own house/company house, hostel, and camping;

¹: T test for independent sample; ²: Qui square test; ³: Mann-Whitney test; ⁴: Dependent variable: Disease during travel; Independent variable: all variable with $p < 0.200$ in univariate analysis (time between consultation and travel, Destination and travel duration); Method: ENTER.

OR: odds ratio; 95%CI: 95% confidence interval

low frequency of minor adverse reactions (around 2%) suggest that travel-related vaccination is safe. Vaccination refusal, by the remaining travelers, may be related with monetary concerns, lack of time, and overlooking the importance of vaccines.

One of the most meaningful results of this study is the high percentage of travelers (around 85%) with lack of disease or injury while traveling. In fact, other studies regarding travel-related morbidity in children have reported significantly higher rates of ailments in children travelling to tropical countries.^{2,7} This can be due to a variety of factors from which we highlight the absence of pretravel health advice.

Regarding medical complications during traveling, diseases/injuries were more frequent in the younger (< 10 years) compared with the older (18.9% vs 9.2%; $p = 0.075$) children. The most common diagnoses were acute diarrhea, febrile illness, and dermatologic conditions, as reported in other studies.³ Given the low number of reported events, we were not able to find predisposing factors for the occurrence of incidents (disease versus injury). The occurrence of injuries originating from insect bites and sunburn reinforces the need to invest on preventive advice in the traveler's consultation.

Diseases or injuries that required medical advice during the trip did not require hospitalization or anticipation of the return to the country of origin, reflecting the relative benignity of the events. After return, 99.1% of pediatric travelers had no symptoms and did not present disease sequelae, which corroborates the travel safety evidenced in this study.

Considering the factors affecting the occurrence of disease events, an inferential analysis showed that the continent of destination Africa and longer trips were significantly associated with higher rates of disease events ($p = 0.023$ and $p < 0.001$, respectively). However, in a multivariable model, only traveling to Africa was significantly associated with disease during travel [OR = 2.736 (1.037 - 7.234)]. Considering the selected variables, among travelers with the same characteristics, those who went to Africa were at higher risk. This subgroup of pediatric travelers stayed more often in family and friends' houses. Given that the length of their stay was not significantly different from that of travelers to Asia or other continents, the type of accommodation may be related with the higher risk of occurrence of events, as mentioned above. We found that travelers to Africa and to Asia had similar median age (nine and 10 years, respectively) and similar travel length, confirming that the risk in Africa may be higher compared to Asia. The statistically significant difference between Africa, Asia and other continents may be related with poor sanitary conditions in Africa. This adds importance to the recommendations made during the pre-

travel consultation and may also have implications in terms of travel insurance related decisions.

This study has some limitations such as its retrospective design, the small sample size, and different time intervals between the travels and the phone calls, which may have caused difficulty in recalling the travel events.

Further studies are needed to validate these results and a national register from travel clinics would be useful to increase sample size and the amount and consistency of the collected data.

CONCLUSION

This study included 223 children and adolescents traveling abroad and reported health-related events in 15.2% of travelers; half of these travelers required an urgent medical appointment at the destination. The most common diagnoses during travel included diarrhea, febrile illness, and dermatologic conditions. African countries and longer travels were associated with a higher occurrence of health-related events.

AUTHORS CONTRIBUTION

SF: Literature review, data acquisition, draft of the manuscript, critical review of the paper.

SP: Literature review, data acquisition.

AM, CCD: Statistics analysis, critical review of the paper.

CF: Design of the word, literature review, critical review of the paper.

CA: Design of the word, coordination, critical review of the paper.

PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.

DATA CONFIDENTIALITY

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

COMPETING INTERESTS

The authors have declared that no competing interests exist.

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