

# Detection of *Bulinus truncatus* in Parts of Khuzestan Province, Iran, During October 2015

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## Abstract

**Background:** *Bulinus truncatus* is the intermediate host of *Schistosoma haematobium*, which is a causative agent of urinary schistosomiasis, a parasitic disease that has been given high priority by the world health organization. Although schistosomiasis was eradicated from Iran decades ago, *Bulinus truncatus* has been reported in some regions of Khuzestan. In addition, in recent years, cases of urinary schistosomiasis have been described in Iran's neighboring country Iraq. It is therefore possible that the disease may reemerge in the Khuzestan region in the future.

**Objectives:** This study aimed to determine whether *Bulinus truncatus* is present in parts of Khuzestan province, Iran.

**Materials and Methods:** Using a hand net, samples were taken from irrigation canals in 27 locations in Khuzestan province during October 2015. The collected materials were placed in a plastic container. The samples were then washed on a mesh screen. The snails were separated and dried at room temperature. Identification was carried out according to the morphological characteristics of the shell. A descriptive data analysis was subsequently conducted.

**Results:** *Bulinus truncatus* was detected in seven locations. In addition, *Melanoides tuberculata*, which is also considered medically important, and *Physa acuta* were detected. The prevalence of *Bulinus truncatus*, *Melanoides tuberculata*, and *Physa acuta* was 6%, 5.5%, and 88.5%, respectively.

**Conclusions:** Preventive measures to eliminate *Bulinus truncatus* should be applied in the Khuzestan region of Iran.

**Keywords:** Parasitic Diseases, Iran, Snails, *Bulinus*, *Schistosoma haematobium*

## 1. Background

Molluscs play a major role as intermediate hosts in the transmission of schistosomes (1), and *Bulinus truncatus* is the intermediate host of *Schistosoma haematobium* (2, 3). *Schistosoma haematobium* is one of the causative agents of schistosomiasis and mostly affects the urinary bladder in humans. The adult worms live in the veins of the bladder and pelvic plexus of the definitive host. They lay eggs that cause chronic granulomatous inflammation in the bladder wall, leading to severe pathology, before finally being released in the urine (4). If contaminated urine-containing eggs of *Schistosoma haematobium* reach water bodies, the eggs release larvae that penetrate the appropriate snail (*Bulinus* sp.) (5). Developed larvae (cercaria) then leave the snail and wait for contact with human skin via contaminated water to begin infection (5). The clinical presentation of infection with *Schistosoma haematobium* includes hematuria, hydronephrosis, anemia, and genital and urinary tract lesions (6, 7). In severe cases, infection may lead to kidney damage and bladder cancer in later years (7). The disease has been eradicated from Iran but still exists in

some countries in Africa and parts of the Middle East (8, 9). Because the intermediate host is present in Khuzestan, Iran, there is a probability that the disease could reemerge in the future. Furthermore, detection of *Bulinus*-inhabited regions is necessary for effective control.

## 2. Objectives

The current study was conducted to evaluate possible contamination with *Bulinus truncatus* in irrigation canals in the parts of Khuzestan province that neighbor Iraq.

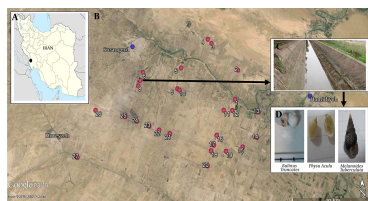
## 3. Materials and Methods

### 3.1. Study Location

The study site (Figure 1) comprised a border region in Khuzestan Province, Iran. The area is situated between three cities, namely Susangerd (31°33'39.73"N/48°11'8.15"E), Hoveyze (31°27'41.54"N/48° 4'27.71"E), and Hamidieh (31°29'0.67"N/48°26'1.59"E). The weather in the region is

hot in summer and mild in winter. The average temperature and humidity in the area are 13°C and 70% in winter and 35.1°C and 30% in summer, respectively (10).

**Figure 1.** Study Area and Detected Snails in Khuzestan Province, Iran



A, the location of the study site (black dot) on a map of Iran (11); B, the locations of the sampling sites (red dots) in the study region (12); C, an irrigation canal; D, the detected snails (from left to right): *Bulinus truncatus*, *Physa acuta*, and *Melanoides tuberculata*.

### 3.2. Sampling

A total of 27 samples were obtained from irrigation canals in 27 locations in Khuzestan province during October 2015. The sampling sites were selected according to their accessibility. One sample of precipitation was taken from each sampling location. The sampling process consisted of one movement of a hand net (pore size 1 mm) at the bottom of the canal with a distance of 50 cm in each sampling site. The collected materials were placed in a plastic container, and the samples were then washed on a mesh screen (pore size 2.80 mm, Endecotts, United Kingdom) with tap water. The snails were separated on the mesh screen and dried at room temperature.

### 3.3. Snail Identification

The snails were identified according to the morphological characteristics of their shells based on the Mansoorian study (13).

### 3.4. Statistical Analysis

A descriptive data analysis was carried out after separating the *Bulinus truncatus* snails from the snails collected at each sampling site. The percentage of identified snails was calculated using descriptive statistics via SPSS (version 16).

## 4. Results

*Bulinus truncatus* was detected in seven locations (Figure 1 and Table 1). *Melanoides tuberculata*, which is medically important, and *Physa acuta* were also detected (Figure 1 and Table 1). The prevalence of *Bulinus truncatus*, *Melanoides tuberculata*, and *Physa acuta* were 6%, 5.5%, and 88.5%, respectively.

## 5. Discussion

The results of the current study correlate with previous studies by Mansoorian and Chue et al. in the region (13, 14). The presence of *Bulinus truncatus* in the border region of Khuzestan Province, Iran, is significant for public health, particularly that of the local inhabitants, because the area neighbors Iraq, which has been involved in a war, and where some reports of schistosomiasis have been confirmed in recent years (8, 15, 16). The long war in Iraq has caused health priorities, such as the control of diseases, to become less important or neglected. Although new cases of schistosomiasis have not been reported in Iran for a few decades, preventive measures, especially biological ones, should be applied to curb the *Bulinus truncatus* population in Khuzestan province. Previous studies have shown the presence of *Bulinus truncatus* in Khuzestan (13, 14), but there is a need for annual monitoring of the water bodies in the region. Possible reasons for the low detection rate of *Bulinus truncatus* in the current study (7 out of 27 sites) may be due to various factors, such as the time of the sampling, ecological factors, the water flow rate in the irrigation canals, flora, the sampling method used, and the sampling locations.

In the current study *Melanoides tuberculata*, which is medically important, and *Physa acuta* were also detected. Some parasitic diseases in which *Melanoides tuberculata* is the intermediate host include heterophyiasis, cercarial dermatitis, and echinostomiasis, and it is possible for humans to be infected with all of them (17).

The limitation of the present study was the absence of a molecular method to confirm the genus and species of *Bulinus truncatus*. Nevertheless, this study demonstrates that *Bulinus truncatus* is still present in the Khuzestan region, and a preventive program should be put in place to control and ultimately eliminate it. The author recommends that a broader study be conducted in Khuzestan province.

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## Footnote

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**Table 1.** GPS Coordinates and the Number and Percentage of Snails Identified in Each Sampling Location in Khuzestan Province, Iran

Sampling Sites	GPS Coordinates (Latitude/Longitude)	Identified Snails	Identified Snails, No. (%)
1	31°29'13.86"N/48°19'37.02"E	-	0
2	31°31'9.54"N/48°20'8.28"E	P	6 (2.7)
3	31°33'10.24"N/48°18'1.67"E	P	13 (5.8)
4	31°33'28.86"N/48°17'44.00"E	B	1 (0.5)
		P	10 (4.5)
5	31°31'37.00"N/48°15'11.72"E	-	0
6	31°31'31.75"N/48°11'50.84"E	P	17 (7.6)
7	31°31'0.08"N/48°11'34.95"E	B	1 (0.5)
		M	4 (1.8)
		P	11 (5)
8	31°30'39.20"N/48°11'24.51"E	P	8 (3.6)
9	31°30'14.73"N/48°14'46.24"E	B	2 (0.9)
		P	6 (2.7)
10	31°30'9.25"N/48°14'56.00"E	P	9 (4)
11	31°28'35.96"N/48°18'34.12"E	-	0
12	31°28'32.46"N/48°19'17.63"E	P	5 (2.3)
13	31°28'17.81"N/48°21'27.57"E	-	0 ( )
14	31°26'43.56"N/48°21'6.15"E	-	0
15	31°26'13.01"N/48°19'50.43"E	B	4 (1.8)
		P	7 (3.2)
16	31°27'4.37"N/48°17'47.95"E	P	13 (5.8)
17	31°26'29.20"N/48°17'30.28"E	-	0
18	31°26'9.16"N/48°17'13.89"E	B	1 (0.5)
		M	2 (0.9)
		P	15 (6.7)
19	31°26'2.95"N/48°18'26.60"E	-	0
20	31°25'17.45"N/48°16'51.02"E	-	0
21	31°27'24.90"N/48°13'55.98"E	-	0
22	31°27'41.75"N/48°13'2.79"E	B	3 (1.3)
		P	19 (8.5)
23	31°27'59.43"N/48°12'14.82"E	M	5 (2.3)
		P	12 (5.4)
24	31°28'21.80"N/48°11'13.94"E	-	0
25	31°28'43.19"N/48°10'15.81"E	P	7 (3.2)
26	31°29'16.85"N/48° 7'45.08"E	B	1 (0.5)
		P	23 (10.3)
27	31°26'27.30"N/48° 6'18.84"E	M	1 (0.5)
		P	16 (7.2)
<b>Total</b>			<b>222 (100)</b>

Abbreviations: B, *Bulinus truncatus*; M, *Melanooides tuberculata*; P, *Physa acuta*.

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