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## Risk factors and prevalence of taeniasis among displaced peoples in Ombadda Omdurman, State-Sudan

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### Abstract

**Background:** Taeniasis is infection of human with intestinal cestode tape worm parasites belonged to the genus *Taenia* species *saginata* and *solium*.

**Objective:** The study aimed to determine the risk factors and prevalence of taeniasis among displaced peoples district in Ombadda Omdurman state- Sudan.

**Material and Methods:** This is a cross sectional study was conducted in Ombadda and Basheer hospitals in Omdurman-Sudan from the period September to November 2021. A total of 150 stools samples were collected and examined using direct microscopy, formal ether concentration technique and Ziehl-Neelsen staining method for detecting *Taenia* Spp.

**Results:** A total number of 150 stools samples collected and examined, 10 (6.3%) out of 150 faecal samples were positive and 140 (93.7%) were negative sample. Out of 10 positive samples 6 (60%) were males and 4 (40%) were females their age groups range from 20 – 60 Years old, The Eggs stage of *Taenia saginata* and *Taenia solium* was identified by using direct microscopy and formal ether concentration techniques and differentiated by the Ziehl-Neelsen staining method.

**Keywords:** Taeniasis; Risk factors of transmission; Displaced peoples; Prevalence

### 1. Introduction

Taeniasis is infection of human with intestinal tapeworms cestode parasites belonged to the genus *Taenia* and It is a significant zoonotic disease (6). Because it may cause cysticercosis in the tapeworm carriers, family members, and other close contacts (17). The most important human pathogen species in the genus *Taenia* are *Taenia solium* the pork tapeworm and *Taenia saginata* the beef tapeworm. The other species *Taenia sciatica* is found only in east Asia (9). *Taenia saginata* and *Taenia solium* are worldwide distributed, *Taenia saginata* found in the countries where cattle are raised awhile *Taenia solium* is most common found in latin America, Southeast Asia and Africa practically prevalent in rural area where domestic pigs are found (3, 19). Human infected with *Taenia saginata* and *Taenia solium* when they consumption infected beef meats or pigs' liver which were poorly cooked and eaten (8). These parasites have been complete indirect life cycle in two hosts, the definitive host was human which harbors the adult worm a while Porks and Cattles are intermediate host which was harbors the larva infective stage (15). Eggs or gravid proglottids are passed with feces of human the eggs are highly infectious and can survive for days to months in different environmental

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sources(7). Cattles and pigs be come infected by ingesting vegetation contaminated with eggs or gravid proglottids. *Taenia saginata* and *Taenia solium* consider to be like other several parasitic diseases cause mortality, *T. solium* cysticercosis is one of the most lethal parasitic diseases and is the most important foodborne Parasite ( 16). In terms of health and economic burden, *T. solium* has been reported as the first, and *Taenia saginata* as the nineteenth foodborne parasite at the global level [4]. *Taenia saginata* has a global distribution nin Sudan than *T. solium* because it is considered one of the public health problem it is increasing mostly in the area where catles were arizing in community and if untreated causes economic burden and sever complication in human.

## 2. Material and methods

This is a cross sectional study was conducted in Ombadda and Basheer hospitals in Omdurman State-Sudan from September to December 2021. A total of 150 faecal samples were collected in containers contain 10% formal saline as preservative reagents. were examined by microscopy and forma ether concentration as diagnostic methods, preserved faeses in formal saline were emulsified and homogenized, one drop of emulsified faecse suspensions placed on a slide microscope, covered with cover class, examined microscopy by wet preparation technique, using the 10 x objective and 40x objective of microscope lens for detecting segments and eggs of *Taenia* SPP in faeces. Using formal ether concentration method, 1g of faeces emulsified in 4 ml of 10% forma water in test tubes, 3-4 ml of formal water added further in test tubes mixed well, emulsified faeces sieved in beaker, 2-3 ml of diethyl ether added to the suspension and mixed in the test tubes, homogenate suspension was centrifuged at 750-1000 g for 1 minute and the sediment was examined microscopically by using the 10 X objective and 40 x to identify eggs and segment of *Taenia* Spp. The Eggs stage of *Taenia saginata* and *Taenia solium* was detected, identified and differentiated by the Ziehl-Neelson staining method.

## 3. Results

**Table 1** Prevalence of Taeniasis among displaced peoples in Ombadda and Basheer hospitals Omdurman state

No Examined	Taenia SPP		Total Number
	Positive %	Negative %	
150	10(6.7%)	140(93.3%)	150

**Table 2** Demographic characteristics of 10 patients with Taeniasis in Omdurman state

Variables	Taeniasis SPP		Total No	P-Value
	<i>T. saginata</i> %	<i>T. solium</i> %		
Gender				
Males	5(60%)	1(10%)	10 (100%)	0.454
Females	4 (40%)	0 (0%)		
Ages	9(90%)	1(10%)	10(100%)	
20-30	2(20%)	0(0%)	2(20%)	
31-40	2(20%)	1 (10 %)	3(30%)	0.425
51-60	5 (50%)	0(0%)	5(50%)	
Total	9(90%)	1(10%)	10(100%)	
Occupations	9(90%)	1(10%)	10(100%)	
Student	1(10%)	0 (0%)	1(10%)	0.566
Non workers	1(10%)	1(10%)	1(10%)	
Farmers	2(20%)	0 (0%)	2(20%)	0.001
Slaughters	5 (50%)	1(10%)	1(10%)	
Total	9(90%)	1(10%)	10(100%)	

A total of 150 faecal samples collected from displaced peoples in Ombada hospitals Omdurman - state examined. 10 (6.3%) out of 150 faecal samples were positive and 140(93.7%) were negative samples for *Taenia* Spp (Table1). The 10 positive samples that were seen in faecal samples *Taenia saginata* was 9 (90%) and *Taenia solium* 1(10%) the eggs stage of *Taenia* Spp was identified using direct microscopy and formal ether concentration as diagnostic methods and differentiated by the Ziehl-Neelson staining method (Table3). Among these 10 positive samples 6(60 %) were found to occur in males' and 4 (40 %) were found in female's patients the difference was found to be statistically significant ( $P$ . Value=0.454) as shown in (Table2). All patients came from displaced area their age groups range from 20 – 60 Years old and The age groups 31-40 to 51-60 Years old were most commonly infected by *Taenia* SPP this difference was found to be statistically significant ( $P$ . Value=0.425) (Table2) The Infection rate decreased in Patients their jobs 1(10%) were students and 2(20%) were non workers this difference was found to be statistically significant ( $P$ . Value=0.566) in (Table2). Patients jobs 5(50%) Slaughters and 2(20%) farmers were more susceptible to *Taenia* Spp infection in both sexes than other occupied elsewhere the difference was found to be statistically significant ( $P$ . Value 0.001) (Table 2). High infection rate occur in Patients had past history of eating under cooked meat of beef 9(90%) and eating under cooked meats of pork 1(10%) there was correlation association between *Taenia* SPP infection and peoples has cultural practices eating under cooked meat of beef and meat of pork the difference was found to be statistically significant ( $P$ . Value 0.001) (Table4). Infection rate increased in patients not using toilet for defecation and decreased in patients using toilet for stool disposable (Table 4).

**Table 3** Morphological differences between *T. saginata* and *T. solium* eggs using the Ziehl-Neelson staining method in 10 patients in Ombada hospital

Total of faecal examined	Taenias is positive	the Ziehl-Neelson		Total no
		<i>T. saginata</i>	<i>T. solium</i>	
150	10	9(90%)	1 (10%)	10(100%)

**Table 4** Prevalence of taeniasis and associated risk factors in displaced peoples

History of eating raw meats	<i>T. saginata</i>	<i>T. solium</i>	Total No	P. Value
Pork raw consumption +ve (1)	0 (0 %)	1(10%)	9(90%)	
Beef raw consumption +ve	9(90%)	0(0%)	1(10%)	0.001
Total	9(90%)	1 (10%)	10(100%)	
Method of stool disposable				
Open defecation yes (8)	8 (80%)	0(0%)		
Using Toilet yes (2)	1(10%)	1(10%)		0.001
Total	9(90%)	1(10%)	10(100%)	

#### 4. Discussion

The results obtained in the present study indicated that the overall infection rate of Taeniasis among the displaced people was 6.4% this percentage result is considered to be a higher rate of infection when compared by previous study obtained by (Ghada et al., 2016) (10) found that (1.6%) in Sudan and higher than percentage results by (McCleery et al., 2015) (13) reported a low prevalence rate (2.9%) of taeniasis among refugees living on the Thai-Myanmar border in Thailand and were extremely lower when compared by previous results reported by (Wongsaroi et al., 2014) (20) in Korea reported that 18.2% of Taeniasis among Korean people probably due to consumption raw meats or under cooked meats of beefs and porks which was containing infective stage of Taeniasis. Our results in the present study showed that *Taenia saginata* infection rate was 9(90%) and *Taenia solium* infection rate was 1(10%) this indicates that *Taenia saginata* was more prevalent in displaced people than *Taenia solium* due to Muslim religion in the area and population raises cattle's houses, for food or for breeding, which was a risk factor for taeniasis this result obtained when compared by previous study by (Anantaphruti et al., 2007) (2) in Thailand showed significant differences. When we analyzed the taeniasis infection in the gender, the prevalence rate was highest in males 6(60%) and lower in females 4(40%) the middle-aged groups ranging from 20–60 years old to 31–40 years old and 51-60 Years old were most commonly infected by *Taenia*

*saginata* this significant differences of a higher infection in males agreement with previous study by( Ng-Nguyen et al., 2018) (14 ) reported in highlands of Vietnam where it was noted that males has history of consumption raw meats and undercooked meats of beefs and pork's as cultural practices in dis place area. The results obtained showed that there are no Taeniasis infection reported in children age group(< 20 Years old)this may be due to fact that the samples size of stools was collected in sufficient to declared that children are not in risk of infection by Taeniasis when compare this results with previous studies showed that highly significant differences has been reported by (Lit et al.,2019)(11) in China ,(Madinga et al.,2012)(12) in Chan go and(Xud-M et al., 2010)(21) in Philippines reported that the highly Taeniasis infection found in children age group( < 20 Years old) .In the present study the Infection rate of Taeniasis carriers decreased in Patients their jobs 1(10%) were students and 2(20%) were non workers this results agree with the previous results reported by(Openshawetal., 2018) (1)in western Sichuan, People's Republic of Chinaand were predominantly occur in Patients their jobs 5( 50% ) Slaughters and 2(20%) farmers infection in both sexes than other occupied elsewhere this differences declared that the displace peoples a history of consuming raw or undercooked raw pork. , beef raw meats , working in corn fields and by cooking at their work places which was the most predominant risks factor for prevalence of Taeniasis similar results reported by (Swastikaetal.,2017) (18) in Karangasem Villages Indonesia .The present study showed that infection rate increased in patients has history of passing stools outside their houses not using toilet for defecation and decreased in patients using toilet for stool disposable which pre-oral infection by Taenia eggs These are important risk factors of taenias is when compared by previous results reported by (Ito et al., 2020) (23) showed similarity.

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## 5. Conclusion

Taeniasis is the major public health problem mostly associated with those have poor hygiene habit, lack of meat inspection, bush defecation and poor waste disposable which has been considered risk factors for Taeniasis, slaughtering practices have contributed to the establishment and transmission of disease, *Taenia saginata* is more common and prevalent in displaced people than *Taenia solium*, consumption under cooked Beef meats and pork meats has been hazardous and risk factors facilitated transmission of Taeniasis. The results obtained showed that the Ziehl-Neelson staining method used more effective in parasites differencation than other techniques used.

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## Compliance with ethical standards

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### Disclosure of conflict of interest

There are no conflict of interest.

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