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Research Article

A Comparative Study of Intestinal Parasitic Carriage in Pregnant-Non Pregnant Women

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Abstract: Intestinal parasitoses are a public health problem in developing countries. Our study aims to determine the frequency and contributing factors of intestinal parasitic infections in pregnant women are often exposed to the environment but also by their own behavior. This is a prospective descriptive study of prevalence conducted over a period of fifteen months from October 2009 to December 2010 in collaboration between the Department for Parasitology and Medical Mycology and Gynecology department obstetrics of the Military Hospital of Instruction Mohammed V (HMIM V) in Rabat. After establishing a information sheet (epidemiological data, medical history) and collected stool, stool examination was held in two stages: a macroscopic examination and microscopic examination. During the study period, we included 70 pregnant women of which 46 are parasitized, with an infection rate of 65.7% compared to 48.7% among 70 non-pregnant women examined, corresponding to a 17% difference between the two populations and that is statistically significant. No helminthes was found. Porting of protozoa with pathogenicity is encountered in 4.3% of pregnant women parasitized. 23 pregnant women are poly-parasitized, with 32.8% of the total sample. This study shows that the prevalence of intestinal parasitism is quite high in pregnant women. Several parasitic species are found. This finding can be explained by the poor living conditions and poor hygiene favoring endemicity and sustaining transmission. The impact on health is significant especially when compounded by malnutrition. The best way to fight against this scourge is prevention and awareness.
Keywords: Intestinal parasitic infections, Prevalence, Simple parasitic Index, Pregnant Woman.

INTRODUCTION

Intestinal parasitoses are a health problem especially in developing countries. Parasitic diseases are closely related to poor sanitation (unavailability of drinking water, improper disposal of human waste, lack of latrines) or poor personal hygiene. Therefore, they have become relatively rare in industrialized countries, which is not the case of developing countries including Morocco.

Whether it is protozoan or helminthiasis, intestinal parasitosis have high prevalence in many regions worldwide. Amoebiasis, roundworm, ascariasis and hookworm infection are among the ten most common infections in the world [1]. Other parasites such as strongyloidiasis are important in public health [2].

According to estimates by the World Health Organization (WHO) in 2002 [3], the number of infected digestive parasites is estimated at 3.5 billion and to 450 million the number of sick patients.

Factors contributing to the endemicity and sustainability of transmission remain complex. The impact of these parasites on the health of individuals and communities is more or less severe depending on various factors: the parasitic species; intensity of infestation; the nature of interactions between the parasite and the concurrent infections; nutritional and immune status of the population [4].

The pathogenicity of parasites varies from simple asymptomatic carriage to the very serious and even fatal clinical pictures in case of massive infestation.

Helminthparasitoses or protozoan parasitoses are a major cause of morbidity and mortality in the world and especially among pregnant women and children in developing countries. It will represent real public health problems [5]. However, a review of the world literature shows that few studies have been done on parasite coprology of women during pregnancy a global scale. [6] This is the case in Morocco where, to our

knowledge, no study on intestinal parasites in pregnant women has been conducted.

MATERIAL AND METHODS

This is a prospective and descriptive study of prevalence conducted over 15 months, from 1 October 2009 to 31 December 2010 and held in collaboration between the Department for Parasitology and Medical Mycology and Gynecology department obstetrics of the Military Hospital of Instruction Mohammed V (HMIM V) in Rabat.

Our study included all pregnant women in the 2nd and 3rd trimester pregnancy consulting in gynecology department whatever the reason for consultation. Meanwhile, non-pregnant women consulting in the same department are also selected as a control group for comparative analysis.

A parasitological examination of stools as part of prenatal check was issued to patients who meet the inclusion criteria by the staff of the gynecology department.

After a free and informed consent of the patients, a form of farm is met, and then a fresh stool sample is collected. For each sample, macroscopic examination, direct examination and two concentration techniques were performed. Meanwhile, the information sheet was completed.

RESULTS

We recruited 70 pregnant women with an average age of pregnancy of 6.5 months. The average age of these patients was 32.5 years, with a range of 20 and 45. We found 46 women parasitized corresponding to a prevalence rate of 65.71%. We also selected a batch of 70 non-pregnant women aged 18-50 years, mean age 31.71 years. We found 34 women parasitized, corresponding to a prevalence rate of 48.59% (Table 1).

Effects of Age

Table 1: Prevalence of parasitism according to age

Age	< 20		[20-30]		[30-40]		≥ 40	
	Pregnant	Non Pregnant	Pregnant	Non Pregnant	Pregnant	Non Pregnant	Pregnant	Non pregnant
Number of women examined	0	5	33	24	32	27	5	14
Number of women parasitized	0	1	22	13	20	13	4	7
Parasitological prevalence (%)	0	20	66,7	54,16	62,5	48,14	80	50
Polyparasitism prevalence (%)	0	0	45,5	53,84	60	30,86	25	85,71

Parasitic species found

The total of parasites found in pregnant women is 81, while that found in non-pregnant women was 61 (Table 2).

Table 2: Number and percentage of parasitic species found according to age

	Parasite		< 20		[20-30]		[30-40]		≥ 40	
			Number	%	Number	%	Number	%	Number	%
Amoebas	*E. Coli*	Pregnant	-	-	0	0	1	5	0	0
		Non pregnant	0	0	0	0	0	0	4	57,14
	D.fragilis	Pregnant	-	-	8	36,36	8	40	0	0
		Non pregnant	0	0	2	15,38	2	15,38	6	85,71
	E.histolytica	Pregnant	-	-	0	0	0	0	0	0
		Non pregnant	0	0	0	0	0	0	1	14,28
	E.nana	Pregnant	-	-	6	27,27	9	45	3	75
		Non pregnant	0	0	8	61,53	4	30,76	4	57,14
	P.butschlii	Pregnant	-	-	1	4,54	2	10	0	0
		Non pregnant	0	0	1	7,69	2	15,38	0	0
	Total	Pregnant	-	-	15	-	20	-	3	-
		Non pregnant	0	-	11	-	8	-	15	-
Flage-llates	*G. intestinalis*	Pregnant	-	-	1	4,54	1	5	0	0
		Non pregnant	0	0	0	0	0	0	0	0
B. hominis		Pregnant	-	-	21	95,45	18	90	2	50
		Non pregnant	1	100	10	76 ,92	12	92,30	4	57,14
Total of parasites		Pregnant	-		37		39		5	
		Non pregnant	1		21		20		19	

Clinical signs

Table 3: Study of the association between the symptoms and the parasitic portage

		Blastocystis hominis	***Endolimax nana***	***Entamoeba coli***	***Dientamoebafragilis***	***Entamoeba hystolytica***	***Giardia intestinalis***	***Pseudolimax butschlii***
Diarrhea	Pregnant	66,66%	25%	0%	33,33%	0%	0%	8,33%
	Non pregnant	80%	20%	0%	20%	0%	0%	0%
Nausea and vomiting	Pregnant	48,48%	27,27%	3,03%	18,18%	0%	3,03%	3,03%
	Non pregnant	0%	0%	0%	0%	0%	0%	0%
Abdominal pain	Pregnant	61,53%	30,76%	0%	38,46%	0%	0%	7,69%
	Non pregnant	23,08%	15,38%	3,84%	11,54%	0%	0%	3,84%
Anemia	Pregnant	40%	35%	0%	35%	0%	0%	10%
	Non pregnant	23,08%	7,71%	0%	0%	0%	0%	0%
Asthenia and anorexia	Pregnant	62,85%	22,86%	2,86%	28,57%	0%	2,86%	5,71%
	Non pregnant	100%	100%	0%	50%	0%	0%	50%

Study of the parasitic index (Table 4)

Simple parasitic index (SPI)

It is defined as the percentage of infected individuals compared to the overall number of patients examined. We found 46 cases parasitized of the 70 pregnant women examined and 34 cases in non-pregnant women, which correspond to an infestation rate of 65.71 and 48.57% respectively.

Specific parasitic index by groups of parasites:

The percentage of subjects parasitized by a parasite or a given group of pests compared to the total number of patients examined.

We will also determine the frequency of different parasites and parasite groups based on the total number of infected individuals and detected parasites.

Table 4: Summary of the impact of various parasites found in pregnant women and non-pregnant women

	Parasite	**Number of women parasitized**		**Specific parasitic index (%)**		**Index compared to infected patients (%)**		**Percentage of parasite based on the total of parasites**	
		Pregnant	**Non pregnant**	**Pregnant**	**Non pregnant**	**Pregnant**	**Non pregnant**	**Pregnant**	**Non pregnant**
Amoebas	*E. coli*	1	4	1,43	5,71	2,17	11,76	1,23	6,56
	D. fragilis	16	10	22,86	11,43	34,79	23,53	19,75	13,11
	E. histolytica	0	1	0	1,43	0	2,94	0	1,64
	E. nana	18	16	25,71	22,86	39,13	47,06	22,22	47,06
	P. butschilii	3	3	4,31	4,28	6,52	8,82	3,70	4,92
	Total	38	34	54,31	45,71	82,61	94,12	46,91	52,46
B. hominis		41	27	58,59	38,57	89,13	79,41	50,62	79,41
G. intestinalis		2	0	2,86	0	4,35	0	2,47	0

Study of poly-parasitism

Poly-parasitism is the coexistence in the same person of two or more parasites (Table 5). In our study, the index of poly-parasitism (IPP) is 50% in pregnant women and 38.85% in non-pregnant women, figures which reflect fairly high multiple infection rate, and higher in pregnant than in non-pregnant women.

In pregnant women

Of the 70 women examined, we found 23 women poly-parasitized, 50% of all women parasitized. This poly-parasitism is distributed as follows: 14 cases of bi-parasitism (20%) and 9 cases of multi-parasitism (17.12%).

In non-pregnant women

Of the 70 women examined, we found 17 women poly-parasitized, 50% of all women parasitized. This poly-parasitism is distributed as follows: 9 cases of bi-parasitism (Amoebae-amoebae and Amoebae-Blastocystishominis) and 8 cases of multi-parasitism.

Table 5: Parasitic associations

Number of associated parasites	Pregnancy	Pure amebiasis		Mixed infestations		Total	
		Number of case	%	Number of case	%	Number of case	%
2	+	0	0	14	20	14	20
	-	2	2,85	7	10	9	12,85
3	+	1	1,42	5	7,14	6	8,57
	-	1	1,42	5	7,14	6	8,57
4	+	0	0	3	4,28	3	4,28
	-	0	0	2	2,85	2	2,85

DISCUSSION

This epidemiological investigation was conducted in pregnant women with a mean age of 32.5 years, of which the base sample is homogeneous and random. The mean gestational age at enrollment was 26 weeks of amenorrhea.

Enrichment techniques used have allowed us to increase the sensitivity of the parasitic research fairly significant.

Helminths such as Ascaris, whipworm, hookworm and anguillule, were not isolated during this investigation, despite the use of specific technical research for some of them.

Simple parasitic index proved to be increased by 13% after concentration techniques. These results confirm what has been reported in the literature about the benefit enrichments in the detection of parasites in a stool examination.

Among women infected by different parasites, we noted that parasite prevalence is higher among pregnant women (65.7%) compared to non-pregnant women (48.6%), with a statistically significant difference between the two groups ($p = 0.003$). This finding may be explained by the decreased immunity during pregnancy.

From the results obtained, it appears that 65.7% of pregnant women who had a stool examination, have one or more parasites in their intestines, so more than three out of five women. The overall prevalence rate is comparable to those reported by Penali *et al*. and Broaletet al in Ivory coast and Nurdia *et al*. in Indonesia which are respectively 53.5% and 69.7% [6, 7]. However, it appears below the infestation rate reported by Rodriguez-Morales et al in Venezuela (73.9%) [8]. Authors of other studies have reported lower parasitic effects compared to our series: Kalenga in Congo (9%), Egwunyenga in Nigeria (12.5%) and Rodriguez-Garcia in Mexico (38.2%) [9-11].

The intestinal parasitic carriage in this study was non-significantly associated with indices being selected to assess the living conditions of women and their families, namely the method of drinking water and parasitic history. However, some authors, rather interested by the factor "number of persons per housing", concluded that parasitological prevalence increases in correlation with the increase in the number of family persons and explained this by the fact that overcrowding and promiscuity are factors favoring parasitic transmission. This factor has not been used in our study.

The intestinal parasitic carriage in our study did not join those reported by other authors on the prevalence of protozoa (100% of the parasites encountered), agents of disease of dirty hands, fecal peril and contaminated food while in other series, the authors noted a prevalence of helminth infections [6, 8]. Non-pathogenic protozoa, reflecting a bad level of hygiene and continuous contact with feces, are the majority in our series with a prevalence of 54.3% of non-pathogenic amoeba. Regarding non-pathogenic amoebae, our results are not comparable to those of the survey conducted in Venezuela, where the prevalence was only 7.1%; this low rate may be reported to the proper level of health where programs fight against parasites have been introduced [8].

The amebiasis and giardiasis are fecal-oral parasitosis common in hot and humid countries. Giardia intestinalis is the only flagellated encountered in this study, it was detected in two pregnant women (no cases have been found in the group of non-pregnant women), which is equivalent to 2, 8% of women screened. If Penali shows a similar rate, while others show higher rates. Moreover, Entamoebahistolytica was not detected in the group of pregnant women [6].

Long considered a commensal of the intestine and initially classified among the fungi, Blastocystishominis remains the most isolated protozoa in our series with a prevalence of 58.6%. Other studies on pregnant women have not identified this parasite in their series. Obviously, do not note the presence of Blastocystishominis in stool is an anomaly. This is a protozoan colic witnessing a dirty power. It must not enter into the pathogenic- nonpathogenic context, but may be actively involved in a diarrheal syndrome [12, 13].

Helminths are not encountered in our study, although they are the most commonly parasites found in other surveys. Rodriguez-Morales et al reported that helminth were the most encountered parasites in the series: Ascarislumbricoides (57%), Trichuristrichiura (36%), Necatoramericanus (8, 1%), Enterobiusvermicularis (6.3%) and Strongyloidesstercoralis (3.3%), while among Penali *et al*., Necatoramericanus is the most common species with a prevalence of 43%, Trichuristrichiura and Ascarislumbricoides have frequencies of 24, 7% for each of these two species and Strongyloidesstercoralis with 2.15% [6, 8].

Ankylostomiasis occupies an important place among helminths encountered in these studies; it was established as a major predictor of iron deficiency. This may explain, at least in part, frequent anemia among pregnant women in these investigations [6, 8]. In our series, 28.5% of pregnant women were anemic. Since pregnancy requires additional nutrients especially iron, and produces a "physiologic anemia" due to hemodilution, it can be assumed that this anemia is not related to parasitosis [14].

We also note that 47.1% of pregnant women experience nausea and vomiting, although no cases have been found in the population of non-pregnant women. It can be concluded that this clinical picture is much more related to pregnancy than intestinal parasitosis.

We finally address the poly-parasitism which affects 32.9% of all pregnant women included in the study; this result is consistent with the 30.4% that was reported by Penali et al whose bi-parasitism constitutes majority with a prevalence of 20%. This frequency is lower than that recorded by Rodriguez-Morales et al (46.9%) [6, 8].

The most experienced parasitic associations are those between amoebae and Blastocystishominis in proportions of 31.4% of cases, the parasites that come up most often are Endolimax nana and Dientamoebafragilis because of their high frequency in our series. Some authors believe that parasitic associations are governed by the law of chance, while others find explanations for these associations based on the mode of transmission of parasites. They explain the associations between protozoa and helminthswith eggs directly infesting (Enterobiusvermicularis and Hymenolepis nana), and associations by pure protozoan by concomitant probability of direct contamination from an infected person. However, fecal-oral infections, which are deferred in time, are most likely in the case of association between parasites removed in immature form requiring a stay in the environment before becoming infective (Ascarislumbricoides eggs , Trichuristrichiuraeggs...) and parasites directly infesting forms.

Newborns of mothers with intestinal parasitosis have a greater probability of being born with lower weight than we expected, although we did not assess this issue in our study [11].

The association pregnancy and parasitosis raises two problems related to both the parasite and antiparasitic treatment. [8] Parasitism in itself does not imply a large embryo-fetal risk. The pregnant woman and her fetus are vulnerable to side effects of parasite treatments. The outcome of accidental administration of an antiparasitic during mass treatment for example, can be considerable. The safety precaution is intended particularly during the first trimester of pregnancy and lactation. So be careful in the handling of molecules during pregnancy or in women of childbearing age, except under cover of effective contraception and really followed [14].

The choice of an antiparasitic will consider the age of the pregnancy, the child and the benefit-risk expected from a prescription which is never insignificant, although formal counter indications are rare [5].

At the end of this work we recommend:

- An awareness of the close relation between sanitation and parasitic infestation.
- Conducting periodic reviews of stools during pregnancy as part of prenatal check for pregnant women;
- Changing some preventive measures of information and education, and provide specific treatment before pregnancy, because newborns of mothers carrying an intestinal parasitosis were more likely to be born with a lower weight than which is expected [11];
- Routine screening and treatment of anemia and associated factors such as helminths and intestinal protozoan infections is necessary for the population of pregnant women to improve the health of mothers and children, because it is probably better to have a pregnancy free of infection and nutritionally satisfied [8, 10];
- Treatment should be under the prenatal program and be part of the program of prenatal care [15].

CONCLUSION

Epidemiological investigations and interesting different communities seek to screening, diagnosis and treatment of diseases related to fecal matter and hence a greater awareness of the people through the application of the most basic hygiene.

This study shows those intestinal parasitoses are an important part in the pathology of pregnancy, since more than half of this population is infested with various intestinal parasites. This high prevalence is mainly related to living conditions and human behaviors (poor hygiene). The impact on health is

significant especially when compounded by malnutrition.

The high overall rate of parasitism should suggest a deworming in the many cases where a stool analysis is not always possible. However, teratogenic and / or embryotoxic character of most active molecules in helminthes and protozoa should call a lot of caution and admit treatment if symptoms required.

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