

# The Awareness of Health Professionals in Diagnostic Techniques for Intestinal Parasites in Gaza Strip, Palestine

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## Abstract

**Background:** Diagnosis of intestinal parasites still depends on conventional methods in Gaza strip hospitals and private laboratories. **Aim:** This study aimed to evaluate the opinion and the practice of physicians and medical laboratories technologists towards the diagnosis of intestinal parasites in Gaza strip. **Subjects and Methods:** The study was carried out during the period from August 2006 to December 2006. All the subjects during this period were eligible for the interview. The sample size included 371 individuals out of them 270 physicians and 101 medical laboratory technologists (MLTs). Simple random sampling was used to select the physicians and MLTs from eight hospitals and eleven primary health-care centers. **Results:** It was found that (57.8%) 156/270 of physicians depend on the direct smear microscopy in the diagnosis of intestinal parasites in Gaza, compared to (31.7% (32/101) of MLT. Knowledge about the possible correlation of occult blood with reasons other than the presence of intestinal parasites was evident among both physicians and MLTs, reaching over 80% ( $P = 0.08$ ). It was found that (54.4%, 147/270) of physicians and (73.3%. 74/101) of MLTs depend on wet mount result for of *Entamoeba histolytica* diagnosis ( $P = 0.01$ ). **Conclusion:** Low awareness was found among both physicians and MLT regarding the diagnostic techniques used in the examination of intestinal parasites in Gaza Strip. Prescription of medicine by physicians sometimes depends on the clinical picture without laboratory confirmation. Advanced techniques were less used in the diagnosis of intestinal parasites in Gaza strip.

**Keywords:** Attitude, Diagnosis, Entamoeba, Enterobius, Intestinal parasites

## Introduction

The difficult economic conditions and the associated adverse effects on the environment in Gaza strip are major factors in the spread and transmission of infectious organisms, including intestinal parasites. Globally, the diagnosis of helminthes and protozoan infections is carried out by a wide range of direct and indirect techniques. Direct diagnosis includes conventional methods such as wet mounts using saline and iodine, whilst indirect diagnosis includes; antibody and antigen detection, and molecular techniques such as deoxyribonucleic acid (DNA)

probes and polymerase chain reaction (PCR).<sup>[1]</sup> In Gaza strip, in hospital and private laboratories, a single thin faecal smear in saline is generally the only diagnostic method used for the detection and confirmation of intestinal parasites from one fresh stool specimen. Clearly, *Entamoeba histolytica*, an important parasite in Gaza, will not be differentiated from *Entamoeba dispar* with this approach, unless living trophozoites containing red blood cells happen to be detected. Most research in the field of parasitology carried out in Gaza strip in recent years has been reviewed by the author and it is clear that most reviewed articles used the same conventional methods in the diagnosis of intestinal parasites; wet mount while relatively few used the; formal-ether sedimentation techniques, staining, and advanced methods like antigen detection and DNA.<sup>[2-5]</sup> In addition, some protozoan parasites may be misdiagnosed or missed completely by laboratory technologists and only detected during the research studies such as those on *Cryptosporidium* sp. among children<sup>[6]</sup> and *Dientamoeba fragilis*<sup>[7]</sup> (submitted for publication).

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There is a lack of knowledge on the attitudes and practice of health professionals in Gaza regarding laboratory diagnosis of parasitic infections.<sup>[8]</sup>

## Objectives of the Study

To evaluate the attitudes and the practice of physicians and medical laboratory technologists (MLTs) toward the diagnostic techniques for intestinal parasites, especially for *E. histolytica/dispar*, in Gaza strip, In addition, gaining some understanding of the knowledge that such health professionals have in this area will assist in the content of future training programs that aim to increase awareness of approaches available for the detection of intestinal parasites that may influence the development of associated policy across laboratory services in Palestine.

## Subjects and Methods

### Ethical consideration

A study approval was obtained from the Ministry of Health under the no. 2891, and oral agreement from both physicians and MLT were obtained to participate in the study.

### Study setting and population

The Gaza Strip is a coastal zone on the Mediterranean Sea. It is bordered by Egypt from the South, the green line from the North, Nagev desert from the East and the Mediterranean Sea from the West. The total surface area of the Gaza Strip is 365 km<sup>2</sup>, where about 1,644,293 Palestinian people live and work.<sup>[9]</sup> Gaza is one of the most densely populated regions in the world. The Gaza strip is divided geographically into five Governorates: Northern, Gaza, Mid zone, Khanyounis and Rafah.

The target population was the physicians and MLT working in the Palestinian Ministry of Health. The study was carried out during the period from August 2006 to December 2006.

### Sample size calculation

A simple random sampling was originally used to select the participants from eight hospitals and eleven primary care centers in Gaza Strip, for interview. The total sample size was 371 included physicians and MLT. The sample size calculation was based on assuming a prevalence of 50%, the calculated sample size was 371.

The physicians who participated fully were working in a range of departments, including internal medicine and Urogenital Departments in hospitals and primary health-care centers in Gaza strip.

### Questionnaire survey

A self-administered questionnaire was designed, completed by physicians and MLT and returned to the author within

two weeks. Questionnaire included 18 questions designed by a scientific team from the Islamic University of Gaza. The questionnaire was validated by a public health and biostatistics expert and piloted among 8 physicians and 6 MLT not included in the study. The questionnaire was validated by three specialists in microbiology and biostatistics. Most of the questionnaire questions were in the form of yes/no questions.

The questionnaire covered the following items:

Knowledge of physicians and MLT on the diagnostic methods used in parasitology (wet mount, staining, concentration methods, antigen detection and PCR), the extent to which these methods were applied in routine testing in Gaza Strip, attitudes on some techniques used, the use of culture and occult blood methods, the use of scotch tape preparation (STP) in the diagnosis of *Enterobius vermicularis*, attitudes toward using one stool sample only in the case of negative results, personal data including qualifications and years of experience.

### Statistical analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) (version 7.0) (Chicago, IL, USA). Frequency, cross tabulation, Chi-squared, and the association between variables was studied.  $P < 0.05$  was considered significant.

## Results

The study results revealed a high response rate (90.2%), with 371 out of 411. The present study included 270 physicians and 101 MLTs. It was found that 57.8% 156/270 of physicians depend on the direct smear microscopy (DSM) in the diagnosis of intestinal parasites in Gaza, compared to (31.7%) 32/101 of MLT ( $P=0.001$ ). As shown in Table 1, occult blood is correlated with intestinal parasitic infection and physicians were aware about this correlation more than MLT ( $<0.01$ ). Knowledge about the possible correlation of occult blood with reasons other than the presence of intestinal parasites was evident among both physicians and MLT, ( $P=0.08$ ). It was found that 54.4% 147/270 of physicians and 73.3% 74/101 of MLT depend on the wet mount results for of the diagnosis of *E. histolytica* ( $P=0.01$ ).

Most physicians believe that intestinal parasites diagnosis is carried out based on clinical examination (89.6%) in contrast to MLT (48.5%) ( $P=0.01$ ). MLT (39.6%) believed more than the physicians (26.3%) that a negative result from one stool sample is enough to confirm the non-existence of intestinal parasitic infection [Table 1] ( $P=0.01$ ).

There was a variation in the point of view regarding the results of the clinical picture recorded by physicians and the result of laboratory carried out by MLT when diagnosis of intestinal parasites.

When participants were questioned about their beliefs on the diagnosis of *E. vermicularis* by stool examination, 34.1%

of physicians were satisfied with this method, compared to 20.8% of MLT.

Less than half of the physicians (48.1%) and MLT (43.6%) sometimes followed the guidelines of requesting more than one stool for analysis for patients suffering from diarrhea as shown in Table 2.

When we compared the practice of physicians and MLT dealing with patients suffering from diarrhea we found that the physicians (20%) are follow slight recommendation less than MLT (32.7%). Comparing physician with MLT regarding the degree of requesting of more than one test in case of diarrhea the only degree (slightly is follow the guidelines) showed a significant difference ( $P = 0.01$ ) with the physician (20%) lower than MLT (32.7%). Both physicians and MLT recommended the request of more than one stool analysis for diarrhea especially

for children, but not so much for adults. About 70% of physicians and MLT requested stool culture in cases of diarrhea.

The organization and the availability of the care such as stool culture etc., test is known by MLT more than physician is. The availability of stool culture in the hospital and primary care centre labs was high as reported by MLT (64.4%) and the physicians reported lower than MLT ( $P = 0.01$ ).

For advanced techniques required to detect intestinal parasites, physicians recommended such techniques more than MLT ( $P = 0.02$ ).

## Discussion

In Gaza Strip, where infection with intestinal parasites is common, routine tests for the diagnosis and confirmation of

**Table 1: Knowledge and attitudes of physicians and MLT in the diagnosis of intestinal parasites**

Question	Physician (n=270)		MLT (n=101)		P value
	Yes (%)	No (%)	Yes (%)	No (%)	
Do you correlate the presence of occult blood with infection by intestinal parasites?	224 (83)	46 (17)	31 (30.7)	70 (69.3)	<0.01
Do you connect occult blood with other reasons?	224 (83)	46 (17)	91 (90.1)	10 (9.9)	0.08
Do you depend completely on wet mount results for <i>Entamoeba histolytica</i> diagnosis?	147 (54.4)	123 (45.6)	74 (73.3)	27 (26.7)	<0.01
Do you depend on direct smear microscopy for the diagnosis of intestinal parasites?	156 (57.8)	114 (42.2)	32 (31.7)	69 (68.3)	<0.01
Do you believe that the diagnosis of intestinal parasites can be made as a result of clinical examination by the physician?	242 (89.6)	128 (10.4)	49 (48.5)	52 (51.5)	<0.01
Do you believe that one stool sample is enough for confirmation of the presence or absence of intestinal parasite?	71 (26.3)	199 (73.7)	40 (39.6)	61 (60.4)	0.01
Do you think from the point of view there is any difference between the results of clinical picture and the result of laboratory	198 (73.3)	72 (26.7)	83 (82.2)	18 (17.8)	0.08
Do you believe that the physicians depends on stool examination for <i>Enterobius vermicularis</i> diagnosis	92 (34.1)	178 (65.9)	21 (20.8)	80 (79.2)	0.01

MLT: Medical laboratory technologist

**Table 2: Practice of physicians and MLT in the diagnosis of intestinal parasites**

Question	Physician (n=270)		MLT (n=101)		P value
	Yes (%)	No (%)	Yes (%)	No (%)	
The recommendation to request more than one stool sample from individuals complaining of diarrhea					
Completely follow the recommendation	86 (31.9)	184 (68.1)	24 (23.8)	77 (76.2)	0.01
Sometimes follow the recommendation	130 (48.1)	140 (51.9)	44 (43.6)	57 (56.3)	0.43
Occasionally follow the recommendation	54 (20.0)	216 (80)	33 (32.7)	68 (67.3)	0.12
Did the physician request or MLT do that for					
Children	149 (55.2)	121 (44.8)	57 (56.4)	44 (43.6)	0.82
Adult	53 (19.6)	217 (80.4)	14 (13.9)	87 (86.1)	0.20
Both	68 (25.2)	202 (74.8)	30 (29.7)	71 (70.3)	0.38
Do the physician request or MLT do stool culture	185 (68.5)	85 (31.5)	71 (70.3)	30 (29.7)	0.74
The availability of stool culture test in the hospital laboratory you work in	136 (50.4)	134 (49.6)	65 (64.4)	36 (35.6)	0.01
Do the physician request advanced techniques like: Antigen detection, polymerase chain reaction or MLT do that	70 (25.9)	200 (74.1)	15 (14.9)	86 (85.1)	0.02
Do the physician request scotch tape preparation for <i>Enterobius vermicularis</i> diagnosis the physician request	50 (18.5)	220 (81.5)	14 (13.9)	87 (86.1)	0.29

MLT: Medical laboratory technologist

these infections still largely depends on the use of wet mounts and does this mean a single thin faecal smear in saline and/ or iodine. Such an approach lacks sensitivity and presents real problems, for example, trying to distinguish between *E. histolytica* and *E. dispar*.

Where in some specific cases antigen detection or DNA based techniques should be used. This may indicate the dependence on the wet mount as a basic method and lacking the other diagnostic confirmatory techniques such as sedimentation, flotation, and based DNA methods. This confirms the use of sedimentation and flotation technique as reported in the local studies.<sup>[10]</sup> The knowledge of physicians found high regarding the diagnosis of intestinal parasites according to the clinical examination could be attributed to the reliance of physicians on clinical examination for diagnosis in spite of that clinical signs of parasitic infection are often non-specific.

Both physicians (73.7%) and MLT (60.4%) recognize the need for more than one stool examination before making a negative diagnosis. Generally, a single wet smear from a single stool is the approach for lab diagnosis of intestinal parasites.

Personal behaviour, environment and local guidelines in Gaza, may be important factors when ordering one stool sample by physicians, while CDC recommends that three or more stool samples, collected on separate days, be examine.<sup>[11]</sup>

Both physicians and MLT recommended the requesting of more than one stool analysis in the case of having diarrhea, particularly in children. This probably reflects their knowledge about the risk of diarrhea in young people in whom dehydration and even death may ensure.

Using the stool culture to detect the type of protozoan parasites infections like *E. histolytica* is of most important.

Requesting advanced techniques implies the importance of proper detection of intestinal parasites especially for physicians who are charged with looking after the patient. The decision to request a particular laboratory test on behalf of a patient is the responsibility of physicians rather than MLT. This means that it is essential to have a good working relationship between physicians and laboratory technologists, that the former are aware of tests available in local laboratories and that the latter carry out the diagnostic tests in a reliable, consistent, and timely manner. Actual practice in Gaza may be explained by the fact that physicians need more updating on the practice guidelines for ordering stool samples, whilst MLT need more training in laboratory diagnosis of parasitic infections. Practice has to be feasible for the setting in question; ordering more than one sample is costly, the patient may refuse to co-operate with a request for further testing, the extent and quality of staff resources, laboratory resources and the need to obtain “immediate” results to prescribe medicine by the physician, are all factors that need to be considered when developing a

code of practice. For example, it is recommended that up to three separate, sequentially collected stool samples should be examined in the laboratory, using a reliable concentration technique, to accurately diagnose enteric parasitic infections, including being reasonably confident of the absence of certain parasites.<sup>[12]</sup> The formalin-ether sedimentation technique of Ritchie is excellent for the concentration of both cysts and eggs and it may be applied to formalin-preserved specimens.<sup>[13]</sup> This approach is rarely practiced in Gaza.

It was found that (73.3%) of physicians and (82.2%) of MLT found a difference between the result of the clinical picture and the result of laboratory examination. In our opinion, this was due to the fact that most physicians in Gaza may depend partially on the clinical picture for prescribing medicine. For example, it is common to prescribe vermorin or piprazine citrate in cases of peri-anal itching and suspicion of infection with Enterobiasis, in children, without laboratory diagnosis confirmation. Based on our knowledge, the number of physicians appears to be not enough in the working hospitals in Gaza Strip. It was found that (54.4%) of physicians and (73.3%) of MLT depends completely on wet mount for *E. histolytica* diagnosis. This estimation and percent may reflect the difficulty of identification and differentiation of *E. histolytica/dispar* from other organisms in wet mount. It was supposed using staining techniques to confirm the infection by *E. histolytica/dispar* especially in the case of trophozoites. There is a lot more *E. histolytica/dispar* in Gaza than much of USA, so, surely the emphasis has to be on treating those patients who are diagnosed with acute amoebic dysentery through observing live trophozoites with rbc, when resources are very limited.

In our study, 68.5% of physicians were requesting stool culture for their patients and 50.4% of physicians reported the availability of stool culture in the laboratories of hospitals in which they worked. Culturing provides an environment conducive for excystment and multiplication of trophozoites, which are then readily observed microscopically,<sup>[14]</sup> where the only diagnostic significance of amoebic trophozoites is the observation of the presence of rbc. From the findings 25.9% of physicians reported that they requested advanced techniques such as antigen detection and PCR in spite cost to a poor area like Gaza Strip.

In reality, MLT should be more aware of and use the scotch tape technique<sup>[15]</sup> rather than using stool examination for the detection of *E. vermicularis* but this knowledge has not been achieved. Some studies in Gaza strip reported the prevalence of *E. vermicularis* through stool examination. In addition, only 18.5% of physicians requested STP for *E. vermicularis* diagnosis. This implies that the majority of physicians in this study completely ignored this sensitive method. The difficulty of obtaining STP may explain the situation in our local hospitals and clinics, although cotton bud type swabs would be a perfectly acceptable alternative.

In conclusion, lack of awareness and inadequate practice were found among both physicians and MLT regarding the diagnostic techniques used in the examination of stool for intestinal parasites in Gaza strip. Prescription of medicine by physicians sometimes depends on the clinical picture without laboratory confirmation. In many case of parasitic infection, clinical symptoms are non-specific and such an approach can result in over diagnosis and unnecessary treatment. Advanced techniques are not use in the diagnosis of intestinal parasites in Gaza strip.

We however recommend that Physicians and MLT should be targeted by appropriate workshops and training programs to increase their knowledge, attitudes, and practice. The importance of a sound working relationship between these groups should be included in the training.

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