PSM Microbiology
2017 | Volume 2 | Issue 1 | Pages 1-4
ISSN: 2518-3834 (Online)

www.psmpublishers.org

Short Communication **Open access**

Evaluation of a Qualitative Antibody Detection Method of Typhoid Fever

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Received: 10.May.2016; Accepted: 25.Dec.2016; Published Online: 05.Mar.2017
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Abstract
Whole South East Asia including Pakistan is the hyper-endemic areas for typhoid fever. Clinical diagnosis is not definitive. Blood or bone marrow culture which is still considered as the gold standard in cases of typhoid fever. However bacterial culture facilities are often unavailable and time consuming, there is real need of rapid serological diagnostic test. The present study was conducted to evaluate the % age of IgG and IgM antibodies against the *Salmonella typhi* by Typhidot test. A total of 100 cases of typhoid fever were collected from 1st January 2015 to 31th December 2015 from Pathology Laboratory in Karachi, Pakistan, on which typhidot procedure was followed. The results of typhidot were IgG positive in 11(11%) cases, and IgM positive in 6(6%) cases and both (IgG and IgM) positive in 9(9%) cases. The results of typhidot were negative in 74(74%) cases. It is concluded that the typhidot test is relatively rapid serological test, simple, reliable, less expensive test which fulfills needs of clinicians especially in areas where laboratory services are limited.
Keywords: Typhoid fever, Typhidot, *Salmonella typhi*, IgG and IgM antibodies.

Cite this article: Afshan, A., Hamid, M., Nawaz, B., 2017. Evaluation of a Qualitative Antibody Detection Method of Typhoid Fever. PSM Microbiol., 2(1): 1-4.

INTRODUCTION

Typhoid fever still remains a greater health problem worldwide. *Salmonella typhi* is the etiological agent of typhoid fever. This disease is considered as endemic in the South- East Asia, Indian sub-continent, Africa, the Middle-East, South and Central America, due to insufficient supply of pure water and uncontrolled pollution of sewage water (Gillespie, 2003). Salmon first gave the name Salmonella. He first isolated *Salmonella choleraesuis*, from porcine intestine (Pegues *et al.,* 2005). Wide range of diseases in humans and animals are caused by Salmonella organism and it is active commensals.

In 1843, Austin Flint did classic study about the Epidemiology of typhoid fever. Different clinical symptoms of typhoid fever are characterized by sustained fever, headache, malaise, anorexia, relative bradycardia, constipation or diarrhea, and nonproductive cough (Crump *et al.,* 2004). *S. typhi* cause typhoid fever and *S. Paratyphi* cause Paratyphoid fever. In early 19th century, the disease appeared as a significant infectious disease (Jenkins *et al.,* 2009). In Pakistan typhoid fever is a prevalent disease (Yoshikawa *et al.,* 1980; Hanon, 1991). The global annual burden was estimated at approximately 12 million cases for 2010 (Mogasale *et al.,* 2014).

Salmonella typhi affects various organs of the body and it resides the lymphatic tissues of the small intestine, liver, spleen and bloodstream of infected persons. The disease is pathogenic for both humans and mammals and they are associated with inflammatory reactions (Thong *et al.,* 2000). Contaminated food or drinking water is a main source of infection due to which bacteria can enter the human body where they multiply and disperse in the body via blood circulation (World Health Organization, 2008).

For *S. typhi* the infectious dose is about 10^6 organisms by ingestion and it varies with gastric acidity (Hornick *et al.,* 1967). In summer and wet season, infection is most frequent in young children and older people (Jerrold and Turner, 2010). It is estimated that 1%-5% of patients become chronic carriers, which depends on their age and *S. typhi* persist in the gall bladder of infected persons (World Health Organization, 2003). The disease primarily influences developing areas of the world where sanitary measures and pure water are unavailable (World Health Organization, 2003).

Laboratory tests are performed for the diagnosis of disease. Isolation of the pathogen is done through blood and bone marrow. The disease confirmation from these samples is the most suitable method (Abdoel *et al.,* 2007). Typhoid fever is a significant cause of morbidity and mortality and it is due to emergence of antibiotic resistance

among Salmonella species and as well as delay in diagnosis and appropriate therapy (Bhutta, 1996). In 1940's several antibiotics were used successfully for the treatment of typhoid fever and such antibiotics were chloramphenicol, ampicillin and trimethoptrim-sulphamethoxazole (Ivanoff *et al.,* 1997). *Salmonella typhi* strains showed resistance to multidrugs and it was first observed in 1987 in Pakistan (Yoshikawa *et al.,* 1980; Hanon, 1991). Due to which other curative methods are recommended to treat typhoid fever (Yanagi *et al.,* 2009; Aggarwal *et al.,* 2011). Antibiotic resistant bacteria are causing great damage to public health (Iqbal *et al.,* 2015). The present study was conducted to evaluate the percentage of IgG and IgM antibodies against the *Salmonella typhi* by Typhidot test.

MATERIALS AND METHODS

The data of typhoid fever was collected in a Pathology Laboratory in Karachi, Pakistan, from 1st January 2013 to 31st December 2013. The total 100 cases which were clinically diagnosed as typhoid fever by various clinicians and sent to laboratory for the typhidot test were collected during above mentioned period. Typhidot procedure was followed in these cases. The study was approved by Ethical Review Board of Jinnah University for Women, Karachi, Pakistan.

Collection of blood samples

Five ml blood in disposable syringe was taken from antecubital vein aseptically and transferred to sterile centrifuge tube slowly just to avoid hemolysis. It was allowed to clot and then centrifuged at the rate of 3000 rpm for 15 minutes. Separated serum was transferred with the help of disposable Pasteur pipette to sterile capped tubes and stored at -20 ˚C until processed for analysis. Repeated thawing and freezing were avoided.

Sample preparation

Serum and plasma were separated from whole blood according to standard procedure.

Typhidot (3 Hours)

Typhidot (Dot-EIA) test for specific detection of IgG & IgM to *Salmonella typhi* (Mehmood *et al.,* 2015) was performed using kits manufactured by Reszon Diagnostics International Sdn. Bhd. No. 12A, Jalan TP5 Taman Perindustrian UEP 47600 Subang Jaya Selangor DE, Malaysia. The data obtained was analyzed statistically using SPSS v16.0.

RESULTS

The results of typhidot were IgG positive in 11(11%) cases, and IgM positive in 6(6%) cases and both (IgG & IgM) positive in 9 (9%). The results of typhidot were negative in 74(74%) (Figure 1).

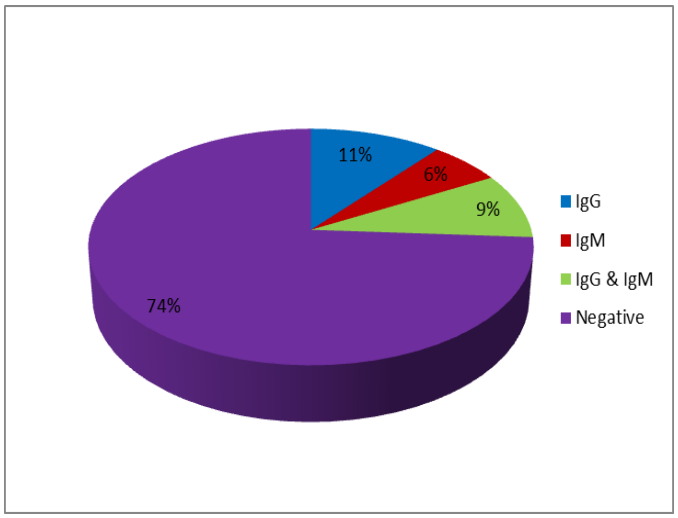

Fig. 1. Evaluation of typhidot results

DISCUSSION

Typhoid fever still remains a greater health problem worldwide. Approximately >100/100,000 cases/year are the highest incidence reported in South-East and South-central Asian countries (Gillespie, 2003). In Pakistan, approximately an annual incidence of 413/100,000 person/year was reported (Crump *et al.,* 2010). We collected total 100 cases of typhoid fever and Typhidot procedure was followed in these cases. Sensitivity and specificity of this test is more than 90% and it is reported in different studies (Choo *et al.,* 1994; Jackson *et al.,* 1995; Lu-Fong *et al.,* 1996; Jesudason *et al.,* 2006). The collected data of 100 cases showed Positive IgG% was 11% which indicates presence of IgG antibodies as it possibly as a result of current infection, previous infection, relapse or re-infection. Positive IgM% was 6% which indicates presence of IgM antibodies and it showed acute typhoid fever, infection at the initial stage. Positive both (IgG & IgM) % was 9% which indicates presence of IgG and IgM antibodies against *S. typhi* and it showed acute typhoid fever but infection at the middle stage. The percentage of negative cases was 74% which indicates absence of IgG, IgM and both (IgG & IgM) antibodies, no typhoid fever was suspected. Similarly Mehmood et al. (2015) reported 47 (32.4%) patients had only IgM positive on Typhidot, 7(4.8%) had both IgM and IgG positive and 91(62.8%) had both IgM and IgG negative. According to a recent study 10 cases were positive and only 01 case was negative by Typhidot test among 11 blood culture positive cases (Garg, 2017).

CONCLUSION

Typhidot is a Dot-EIA test to diagnose typhoid fever. It is relatively rapid serological test, simple, reliable, less expensive test which fulfills needs of clinicians especially in areas where laboratory services are limited. This test is

helpful in those areas where blood culture facilities are unavailable. Stages of typhoid infection can easily indicate and results can also be easily interpretted in this test. It is less time consuming procedure and it has high sensitivity and specificity as compared to Widal test.

ACKNOWLEDGEMENT

The authors would like to express thanks for Department of Microbiology, Jinnah University for Women, Karachi, Pakistan, for providing necessary facilities and materials.

CONFLICT OF INTEREST

There is no conflict of interest.

REFERENCES

Abdoel, T.H., Pastoor, R., Smits, H.L., Hatta, M., 2007. Laboratory evaluation of a simple and rapid latex agglutination assay for the serodiagnosis of typhoid fever. Trans. R. Soc. Trop. Med. Hyg., 101 (10): 1032-1038.

Aggarwal, A., Ghosh, A., Gomber, S., Mitra, M., Parikh, A., 2011. Efficacy and safety of azithromycin for uncomplicated typhoid fever: an open label non-comparative study. Indian Pediatr., 48(11): 553-556.

Bhutta, Z.A., 1996. Impact of age and drug resistance on mortality in typhoid fever. Arch. Dis. Child., 75 (3): 214-217.

Choo, K., Oppenheimer, S., Ismail, A.B., Ong, K., 1994: Rapid serodiagnosis of typhoid fever by dot EIA in an endemic area. Clin. Infec. Dis., 19(1): 172-176.

Crump, J.A., Luby, S.P., Mintz, E.D., 2004. The global burden of typhoid fever. Bull WHO., 82(5): 346-53.

Crump, J.A., Mintz, E.D., 2010. Global trends in typhoid and paratyphoid Fever. Clin. Infec. Dis., 50(2): 241-46.

Garg, N., 2017. A Comparative Study of Widal Test and Typhidot in Rapid Diagnosis of Typhoid Fever. Int. J. Med. Res. Prof., 3(2); 88-92.

Gillespie, S., 2003. Salmonella infection. In: Cook GC, Zumla A, eds. Manson's Tropical Diseases, 21st ed. London, UK: Elsevier Science, Health Science Division; pp. 937- 947.

Hanon, A., 1991. Changing pattern of S.typhi isolates in Pakistan and their unchanged response to Ofloxacin. Int. J. Exper. Clin. Chemother., 4: 225-229.

Hornick, R.B., Woodward, T.E., 1967. Appraisal of typhoid vaccine in experimentally infected human subjects. Trans. Am. Clin. Climatol. Assoc., 78: 70-78.

Iqbal, M.N., Anjum, A.A., Ali, M.A., Hussain, F., Ali, S., Muhammad, A., Irfan, M., Ahmad, A., Irfan, M. and Shabbir, A., 2015. Assessment of microbial load of un-pasteurized fruit juices and in vitro antibacterial potential of honey against bacterial isolates. Open Microbiol. J., 9: 26-32. DOI: 10.2174/1874285820150601E001.

Ivanoff, B., Levine, M.M., 1997. Typhoid fever: continuing challenges from a resilient bacterial foe. Bulletin de l'Institut Pasteur, 95: 129-142.

Jackson, A., Ismail, A., Ibrahim, T., Kader, Z., Nawi, N., 1995. Retrospective review of dot enzyme immunoassay test for typhoid fever in an endemic area". Southeast Asian J. Trop. Med. Pub. Hlth., 26(4): 625-630.

Jenkins, C., Gillespie, S., 2009. Salmonella infections. Manson's Tropical Diseases (22nd ed.) eds Gordon Cook, A. Zumla. Saunders Elsevier publication.

Jerrold, R., Turner, 2010. The gastrointestinal tract: Salmonellosis, in Kumar, V, Abbas, AK, Fausto, and Aster, JC, editors, Robins and Cotran Pathologic Basis of Disease, 8th edition India, Elsevier, p. 801.

Jesudason, M.V., Sivakumar, S., 2006. Prospective evaluation of a rapid diagnosis test Typhidot for typhoid fever. Indian J. Med. Res., 123(4):513-516.

Lu-Fong, M., Ludan, A., Martinez, M., Raymundo, J., 1996. Dot EIA (Typhidot): an aid to diagnosis of typhoid fever among Filipino children. Malaysian J. Child Hlth., 8(Suppl. 1): 163.

Mehmood, K., Sundus, A., Naqvi, I.H., Ibrahim, M.F., Siddique, O., Ibrahim, N.F., 2015. Typhidot - A blessing or a menace. Pak. J. Med. Sci., 31(2):439-43.

Mogasale, V., Maskery, B., Ochiai, R.L., Lee, J.S., Mogasale, V.V. et al., 2014. Burden of typhoid fever in low-income and middle-income countries: a systematic, literature-based update with risk-factor adjustment. Lancet Global Health 2: E570–E580. doi: 10.1016/S2214-109X(14)70301-8

Pegues, D., Ohl, M., Miller, S., 2005. *Salmonella* species, Including *Salmonella* Typhi. In: Mandell G, J Bennett and R Dolin, editors. Principles and Practise of Infectious Diseases. 6th ed. Philadelphia: Elsevier Churchill Livingstone; p. 2636-2654.

Thong, K.L., Bhutta, Z.A., Pang, T., 2000. Multidrug-resistant strains of *Salmonella enterica* serotype Typhi are genetically homogeneous and coexist with antibiotic-sensitive strains as distinct, independent clones. Int. J. Infect. Dis., 4: 194-197.

World Health Organization. 2008. Prepared for World Water Day 2001. Reviewed by staff and experts from the cluster on Communicable Diseases (CDS) and the Water, Sanitation and Health unit (WSH), World Health Organization (WHO).

World Health Organization. 2003. Department of Vaccines and Biologicals, Background document: "The diagnosis, treatment and prevention of typhoid fever, Geneva, Switzerland", p. 19-23.

World Health Organization. 2003. Geneva; WHO/V&B/03.07. Background document: the diagnosis, treatment and prevention of typhoid fever.

Yanagi, D., de Vries, G.C., Rahardjo, D., Alimsardjono, L., Wasito, E.B. De, I., Kinoshita, S., Hayashi, Y., Hotta, H., Osawa, R., Kawabata, M., Shirakawa, T., 2009. Emergence of fluoroquinolone resistant strains of *Salmonella enterica* in Surabaya, Indonesia. Diagn. Microbiol. Infect. Dis., 64(4): 422-426.

Yoshikawa, T.T., Herbert, P., Oill, P., 1980. Salmonellosis - Teaching Conference, Harbor-UCLA Medical Center, Torrance (Specialty Conference). West. J. Med. 133: 408-417.