

Serologic observation and risk factor of yaws in Hamadi Public Health Center, Jayapura

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Abstrak

Latar belakang: Penyakit frambusia masih menjadi masalah yang belum terselesaikan di Kota Jayapura sebab terdapat daerah kantong frambusia di Kota Jayapura. Penelitian ini bertujuan untuk mendapatkan data status frambusia secara serologi dan faktor risikonya.

Metode: Penelitian deskriptif yang dilakukan secara potong lintang. Pemeriksaan laboratorium standar yang digunakan berupa uji *Treponema pallidum* haemagglutination (TPHA) pada 322 kasus yang didiagnosis Yaws di Puskesmas Hamadi dari Januari – Oktober 2016.

Hasil: Faktor risiko frambusia berupa riwayat pernah mengalami frambusia memiliki potensi dua kali lebih besar untuk mengalami frambusia kembali. Faktor risiko frambusia meningkat dua kali lebih besar pada kasus yang kurang berperilaku hidup bersih dan sehat yaitu: jarang mandi dan tanpa menggunakan sabun dan mempunyai kebiasaan jarang/tidak pakai sandal. Potensi risiko meningkat tiga kali pada kebiasaan pakai handuk bersama.

Kesimpulan: Secara serologi dengan TPHA yang positif didapat pada 111 sampel dari kasus dan kontak. Perilaku hidup yang kurang bersih dan sehat merupakan faktor risiko yang mempengaruhi kejadian frambusia. (*Health Science Journal of Indonesia 2016;8(1):25-29*)

Kata kunci: TPHA, frambusia, faktor risiko, perilaku hidup bersih dan sehat

Abstract

Background: Yaws remained an unfinished health problem in Jayapura City, as there still yaws case found. This research aimed to obtain serological prevalence data and determine the risk factors for yaws transmission in Jayapura.

Methods: These was descriptive and cross-sectional research, and TPHA was the standard laboratory test used during the research.

Results: The risk factor of a frambusia in the history of having experienced frambusia has twice as much potential for experiencing frambusia again. The risk factor of frambusia has increased twice as much in less healthy behaviors: rarely bathing and without using soap and having a rare / non-slip habit. Potential risk increased three times in the habit of sharing a towel together.

Conclusion: Serology with positive TPHA was obtained in 111 samples of cases and contacts. Not clean and healthy behavior is a risk factor that affects the incidence of frambusia. (*Health Science Journal of Indonesia 2016;8(1):25-29*)

Keyword: TPHA, yaws, risk factor, personal hygiene

Yaws is a non-venereal infectious disease caused by *Treponema pallidum subspecies pertenue*¹ and it is correlated with self-hygiene and sanitation². This bacteria triumph in humid environment so that it really favor living in the in tropics. It has the world's concern since 50's proofed by the campaign held and mass treatment using Penicillin as an eradication effort³. Yaws remains becoming such a serious health problem in Papua, mainly in Jayapura City. As the capital of Papua province, Jayapura also becomes yaws pocket, currently this disease yet optimally eradicated despite routine mass treatment using Penicillin already conducted by Hamadi's Public Health Center.

The incidence of Yaws in Papua recorded 729 cases during 2012 and 26,7% of the total case found in Jayapura City. The total case declined in 2013 which recorded 714 cases for Papua. However, the case increased to be 31% in Jayapura City. In 2014 the total case returned decreasing, 237 cases recorded, and 53% of the total case found in Jayapura City. Hamadi's working area was the highest contributor for Yaws case in Jayapura City. Since 2010 such program to eradicate yaws already performed in its working area. However, until 2010 the increase for new yaws cases occurred, and it was recorded 543 patients.

Yaws has three different stadium, primary lesion we called "Mother yaws"⁴, in secondary stadium, the lesion heals, but it keeps shifting location then it resides within Lymph⁵. This condition leads to such misdiagnose, and make it difficult to perform such a fixed diagnose. The disappearing lesion is not the only reason that misdiagnose for yaws occurs, it is also triggered by a mistaken physical check happened in a given condition where the yaws primary lesion-like seems appearing. One of the test that can be used to test the yaws is TPHA (*Treponema pallidum Haemagglutination assay*), similar to principle of antibody test in which it detects syphilis. The positive result of TPHA shows that a person is previously exposed to *Treponema pallidum*⁶. Thus, according to the data and facts above, a research to observe the serological description and also the risk factors of yaws including house contact needs to be conducted.

METHODS

The research was descriptive and designed to be cross sectional. The sample collection conducted in Hamadi's Public health center working area. The

research duration was 10 months started in January to October 2016. The total research subject was 322 people aged above 5 years old, previously diagnosed having Yaws, and already got treatment.

The data collection performed by house-visit to the case subject, as well as doing the screening for physical examination to house-contact, remained in Hamadi's Public Health Centre working area. The examination executed by doctor and nurse who had already participated in yaw's workshop. Structured interview using questioner was applied in order to identify risk factors including age, sex, yaws history, towel usage, soap usage, sandal usage and the self-hygiene habit. Serology data was collected by using vein blood sample. The blood was taken for 1 mL, which then saved into the tube then transferred to Laboratory of Microbiology in Institute of Research and Development for Biomedicine in Jayapura.

RESULTS

1. Result of serological examination using TPHA

This research enrolled 322 subjects which consisted of 43 cases and 279 house-contacts.

TPHA (+)	TPHA (-)	TOTAL
111	211	322

According to the table, TPHA result's ratio showed that the positive result was higher in case subject (72, 1%) compared to house contacts, and vice versa for the negative result. TPHA is quite effective to distinguish syphilis and yaws, which refers to its manifest of infection. The positive result is indicated by the blood mass formation due to the antigen-antibody reaction.

In such certain condition, TPHA can perform false negative result as too high antibody or immunity drop status, and vice versa it can perform false positive result, which can be triggered by past infection such as syphilis.

TPHA can be assigned as single assay for treponemal infection, however it's much better combining TPHA along with another serological assay, as a comparison, for example the TPPA. The combination can perform higher validity result. Serological diagnosing needs two different antibodies detection; first is dedicated to against such a treponemal and the remaining one is needed to against the nontreponemal antigen. Nontreponemal Agglutination assay as RPR and

VDRL slide test can act reactive during the early infection's period and commonly turned to be negative after treatment. In the opposite, treponemal agglutination assay including TPHA, TPPA, and FTA, will remain reactive despite the treatment applied. Nontreponemal assay can be used to indicate such active infection and also its transmission that currently occurring in such given area.

2. Result of *Treponema Pallidum Haemagglutination Test* for case and contacts

Case			Contact		
Total	TPHA (+)	TPHA (-)	Total	TPHA (+)	TPHA (-)
43	31	12	279	80	199

3. Data analysis and risk factors in yaws

Table 1. Risk factors in yaws

No	Risk Factor	Primary lesion and TPHA		OR	95% CI
		+	-		
1	Soap usage				
	Seldom/never	68	67	2.4	1.5 ; 3.8
	Ever use	55	132	1.0	
2	Towel usage habit				
	Collective usage	80	75	3.0	1.9 ; 4.9
	Individual usage	43	124	1.0	
3	Sandal usage habit				
	Never	53	50	2.2	1.3 ; 3.6
	Use	70	149	1.0	
4	Record of disease				
	Never experienced	30	24	2.3	1.3 ; 4.2
	Experienced	93	175	1.0	
5	Sex				
	Male	48	76	1.0	0.6 ; 1.6
	Female	75	123	1.0	
6	Age Group				
	1 – 14 year	62	104	0.9	0.5 ; 1.4
	15 – 64 year	61	95	1.0	

DISCUSSION

Apparently different with syphilis yaws doesn't have a particular transmission path through sexual contact, and instead it transmits through direct physical contact. So that such an analysis to any factors

related to direct transmission as the sharing of the common daily household usage collectively, should get a serious concern, mainly the self-hygiene habits. The simplest example in this case was the sharing of daily soap usage in a family. Furthermore, not only the commons sharing usage of the daily household utensil, but also the total individual in a given house who actively performed sharing for household utensil, with the ones who infected by yaws. Such high direct contact density around the ones with Yaws provided bigger chance for the increasing of yaws transmission. This fact can be inferred basically from the TPHA result, where the positive contacts had treponemal infection detected. This result led to an explanation that transmission kept occurring although this short conclusion asked for further study, due to the TPHA could not specifically showed a fixed justification that the positively tested bacteria was the *Treponema pallidum subspecies pertenue*.

Risk factors obtained in this research then already analyzed for its correlation to Yaws incidence. People habit to keep their health well was still inadequate, for instance, they infrequently used soap when they bath, didn't put sandal on their feet, lousy and dirty cloth to wear, and their body-hygiene seemed worst including their nails. The bad personal and surround hygiene and also the lack of Yaws understanding, could be designated to factors which correlated to Yaws incidence. This also was in accordance to the final conclusion of yaws international summit for eradication, that yaws was mostly transmitted through skin direct contact to ones who had bad self-hygiene⁷.

Along with the risk factors, in this research also revealed that lacking quality of self-hygiene had 18 times higher for chance to get infected by yaws, with explanations including; infrequently using soap for bathing had risk factor 2 times higher, habits to share single towel after bathing had potency 3 times higher, and had their feet unprotected by sandal had risk factor 2 times higher. Additional information stated that even Yaws can be transmitted one to another human indirectly through contact with stuffs which already contaminated with infectious mucus originated from yaws lesion. Finally from those explanation above, slightly can be inferred that risk factor for Yaws isn't simply single but complex and affecting one and another. Unhealed and watery lesion also attracts fly to come and make yaws even easier to get spread and transmitted to other persons. Personal history for self-experience infected previously by Yaws 2 times

higher for its incidence. Most of secondary lesion of yaws can get relapsed after treatment in which got dormant for several weeks or several months.

Furthermore yaws basically will be able to relapse after 5 years and if it doesn't get proper treatment since the early infection then Yaws will appear as chronic symptom, relapsed, and difficult to predict and finally trigger long period severe bones deformity

TPHA (Treponema pallidum Haemagglutination Assay) is one the methods in serologic test commonly used to detect the presence of bacterial infection caused by genus Treponema, although this method cannot be used to differentiate Treponema pallidum subspecies pallidum from Treponema pallidum subspecies pertenue physiologically, this method is still considered to be quite effective enough to distinguish syphilis to yaws, which was characterized from the infection. Examination with the TPHA positive cases is characterized by the formation of clots as Treponema pallidum antibody reaction^{8,9,10}

TPHA serological test showed positive result which was indicated that the sample contained Treponema pallidum. However, result for serology was found either case or both have contact TPHA positive results. TPHA effectively used as a single test for treponemal infection but better along with serologic testing comparative, for example TPPA, thus would be getting more valid results. Serologic diagnosis of yaws requires the detection of two different antibodies: the first is intended against a treponemal antigen and the other to fight nontreponemal antigen. Non-treponemal agglutination test (eg, rapid plasma reagent and VDRL slide test) become reactive during the initial period of infection and generally become negative after treatment. Instead treponemal serologic test (eg TPHA / Treponema pallidum haemagglutination and TPPA assay / Treponema pallidum particle assay and FTA/ Fluorescent treponemal antibody absorption) still remain reactive for life and the survival of pathogens, despite being treated. Therefore, non-treponemal test better indicating an active infection and transmission occurred in an area¹¹.

Yaws risk factor actually was not a single but multiple related.^{12,9} Soap usage habit that rarely had roles in the incidence of yaws, was in accordance with the WHO statement which said that yaws could spread among people who rarely shower using soap. The influence of the use of soap into the defender

had strong impact on the disease. Dirty wet yaws lesions were very attracting to flies that could spread the disease easily. Good bathing habits could reduce the incidence of yaws¹³.

History of suffering from yaws had 2 times greater potency against the incidence of yaws. All secondary yaws lesions could be relapsed after treatment, and it would be varied within few weeks to months. Patients may got relapsed after 5 years, when yaws was not treated at an early stage, then it could be turned into a chronic disease, and relapsed would be unpredictable and could trigger severe bone deformities in the long term suffering^{9,14,15}

In conclusion, Serology with positive TPHA was obtained in 111 samples of cases and contacts. Not clean and healthy behavior is a risk factor that affects the incidence of frambusia.

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REFERENCES

1. Mitjà O, Marks M, Konan DJP, Ayelo G, Gonzalez-Beiras C, Boua B, et al. Global epidemiology of yaws: a systematic review. *The Lancet Global Health* [Internet]. 2015;3(6):e324–31. Accessed: <http://linkinghub.elsevier.com/retrieve/pii/S2214109X1500011X>
2. Narain JP, Jain SK, Bora D, Venkatesh S. Eradicating successfully yaws from India: The strategy & global lessons. *The Indian journal of medical research* [Internet]. Mei 2015 [cited 23 November 2016];141(5):608–13. Accessed: <http://www.ncbi.nlm.nih.gov/pubmed/26139778>
3. WHO | Yaws: A forgotten disease. WHO [Internet]. 2011 [cited 20 June 2017]; Accessed: http://www.who.int/neglected_diseases/diseases/yaws/en/#.WUiWdZFUQg.mendeley
4. Kumarasinghe SPW KA. Pintoid Dyschromia of Yaws: A Rare Presentation of a Neglected

- Infectious Disease. *Journal of Pigmentary Disorders* [Internet]. 2015;2(8):1–2. Accessed: <http://www.omicsgroup.org/journals/pintoid-dyschromia-of-yaws-a-rare-presentation-of-a-neglected-infectious-disease-2376-0427-1000202.php?aid=58255>
5. Amin R, Sattar A, Basher A, Faiz MA. Eradication of yaws. *Journal of Clinical Medicine and Research* [Internet]. 2010;2(March):49–54. Accessed: www.academicjournals.org/JCMR
 6. Stamm L V. Progress in treatment and diagnosis of yaws: Hope for eradication? *The Lancet Global Health* [Internet]. 2014;2(7):e369–70. Accessed: [http://dx.doi.org/10.1016/S2214-109X\(14\)70248-7](http://dx.doi.org/10.1016/S2214-109X(14)70248-7)
 7. Maurice J. World Report A massive push to free the world from yaws failed in the 1950s and 1960s. But WHO, emboldened. *The Lancet* [Internet]. 2012;379(9824):1377–8. Accessed: [http://dx.doi.org/10.1016/S0140-6736\(12\)60581-9](http://dx.doi.org/10.1016/S0140-6736(12)60581-9)
 8. Ayove T, Houniei W, Wangnapi R, Bieb S V., Kazadi W, Luke LN, et al. Sensitivity and specificity of a rapid point-of-care test for active yaws: A comparative study. *The Lancet Global Health*. 2014;2(7):e415–21.
 9. Mitjà O, Asiedu K, Mabey D. Yaws. 2013;6736(12):1–11.
 10. Pillay A, Chen CY, Reynolds MG, Mombouli J V., Castro AC, Louvouezo D, et al. Laboratory-confirmed case of yaws in a 10-year-old boy from the Republic of the Congo. *Journal of Clinical Microbiology*. 2011;49(11):4013–5.
 11. Mitjà O, Hays R, Lelngi F, Laban N, Ipaï A, Pakarui S, et al. Short Report : Challenges in Recognition and Diagnosis of Yaws in Children in Papua New Guinea. 2011;85(1):113–6.
 12. Amin R, Basher, Ariful et al. View Point Global Eradication of Yaws : Neglected. *J Medicine*. 2009;10:109–14.
 13. Tettey A. School of public health, college of health sciences, University of Ghana-Legon, factors associated with yaws in the Ga West district of Ghana (A Case-control study at Obom). 2009..
 14. WHO. Handbook of Endemic Treponematoses: Yaws, Endemic Syphilis, and Pinta. 1984. hal. 106.
 15. Koff A, Rosen T. Nonvenereal treponematoses: yaws, endemic syphilis, and pinta. *Journal of the American Academy of Dermatology* [Internet]. 1993 [cited 22 November 2016]; Accessed: <http://www.sciencedirect.com/science/article/pii/019096229370217H>