บทฟื้นฟูวิชาการ

A review of the heterophyid flukes in man

Jitra Waikagul*

Waikagul J. A review of the heterophyid flukes in man. Chula Med J 1985 Oct; 29 (10) : 1131-1138

The heterophyid flukes are intestinal parasites of birds and mammals. Infestations with these flukes are acquired by consuming raw fish containing metacercariae, the infective stage of the flukes. To date, about 21 species have been naturally and experimentally reported in man; pathological effects, geographic distributions, and life cycles are reviewed.

จิตรา ไวคกุล. พยาธิใบไม้ตระกูลเฮตเตอโรไฟอีดีที่พบในคน. จุฬาลงกรณ์เวชสาร 2528 ตุลาคม; 29(10) : 1131-1138

พยาธิใบไม้ตระกูลเฮตเตอโรไฟอีดี โดยปกติอาศัยในลำไส้เล็กของสัตว์ปีกและสัตว์เลี้ยงลูกด้วยนม ติดต่อได้โดยการกินปลาดิบซึ่งมีตัวอ่อนระยะติดต่อ, เมตตาเซอคาเรีย, ของพยาธิตระกูลนี้เข้าไป ถึงปัจจุบันนี้มีผู้รายงานพบพยาธิตระกูลนี้ในคนแล้ว 21 ชนิด พยาธิสภาพ การแพร่กระจาย และวงจรชีวิตของพยาธิในตระกูลนี้ได้รวบรวมไว้ในบทความนี้

* Department of Helminthology, Faculty of Tropical Medicine, Mahidol University.

The family Heterophyidae comprises a number of small flukes, parasitic mostly in the small intestine of birds and mammals. The heterophyids differ from flukes in other families in having a peculiar structure at the genital pore, the gonotyl, that forms the basis of the classification of the family Heterophyidae. The heterophyids are small, usually less than 5 mm. in length, the body usually covered with scale-like spines; oral sucker and pharynx are present, the caeca tubular, the ventral sucker well developed or modified, the gonotyl present or absent, the testes globular or lobed, usually two with well developed seminal vesicle, the ovary pretesticular; the egg small containing miracidium.[1,2] Members of this family are of great interest as they are common parasites in man and domestic animals; infections by some species were believed to have been fatal in the Philippines.[3]

Species Reported In Man

The heterophyids in man have been reviewed by a number of authors.[1,4,5,6] To date, about 21 species have been reported in man, both natural and experimental infections, scientific names and localities recorded are listed in Table 1. In North America, infection with Apophallus venustus has been inferred from the presence of trematode eggs in human faeces,[7,8] there being no other fish-borne trematode whose eggs were morphologically similar in that area. Although infection with Metagonimus romanicus has been considered to occur in man, in Spain,[9] the differential diagnosis between the two species based on egg morphology alone can not be certain as the heterophyid egg is similar to eggs of trematodes in many families such as the opisthorchids, the microphallids and the plagiorchids. Heterophyes dispar and Heterophyes aequalis were reported by Witenberg[5] without detail. Human infection with Cornatrium perpendiculum was quoted by Price[1] but not in the original report of Onji & Nishio.[10] The species mentioned above are not listed here as heterophyids in man. Infection with Procerovum varium, Centrocestus formosanus, Metagonimus minutus and Apophallus donicus has been established experimentally in man. Some localities recorded are not listed here, such as Procerovum calderoni, reported in China by Chen[11] and Hsu[12] but thought to be Procerovum varium by Pearson .[13] Faust,[14] who considered Heterophyes nocens to be a synonym for Heterophyes heterophyes, reported H. heterophyes in Japan and China where it had not yet been found.

In Thailand, Haplorchis taichui was reported in I and Haplorchis yokogawai in 2 of 21 autopsies at Udornthani provincial hospital.[15] Klicks and Tantachamrun[16] initially reported a case of Stellantchasmus falcatus in Chaingmai, but added 3 more cases[17] found in surgical sections of the terminal ileum. Radomyos, Bunnag and Harinasuta[18] found 301 Haplorchis pumilio adults in 12 of 411 faecal materials from patients taking antihelminthic drug. To date, only 4 species of heterophyids have been reported in Thai people, from the subfamily Haplorchinae, Haplorchis-group which was described in detail by Pearson and Ow-Yang.[19]

The incidence of heterophyid flukes in man depends on the culinary habits of the area where fish is an important source of protein. High incidence can be expected where raw fish is preferred; on the other

hand infection take place accidentally by hand or by food and water contamination with the metacercariae.

Pathology

Symptom of this infection vary from case to case, light infection with Metagonimus yokogawai in 154 adults were reported as asymptomatic, but heavy infection in 17,560 adults, were characterized by mild chronic diarrhoea.[20] An infection with 204 metacercariae of M. Yokogawai given orally produced a gastro-intestinal allergy characterized by pyrexia, headache, nausea, muscular and abdominal pain and diarrhoea.[21] Mild necrosis of the intestinal mucosa at the attachment sites of the worms was observed by khalil.[22] An adult Heterophyes was removed from a cerebral cyst in a native of Morocco while the eggs were discovered as subcutaneous and muscular cysts.[23] Neurological symptoms and abnormalities of the cerebrospinal fluid were also reported.[24] A tumour was reported in the abdomen of a Japanese patient and eggs found in the tumour were identified as Heterophyes nocens .[25] this identification was entirely based on eggs and thus may be inaccurate. In the Philippines Africa, De Leon & Garcia[26,27,28,3] reported several species of heterophid flukes, in more than thirty autopsies at the Manila city morgue. In thirteen of those, where deaths were diagnosed as heart failure, eggs were found in organs such as brain, heart, spinal cord, liver lung and spleen, reaching their destination presumably via the circulatory system.

Life Cycle

The known life-cycles of heterophyids follow a pattern common to the superfamily Opisthorchioidea. Eggs are ingested by a gastropod, the first intermediate host; miracidia hatch in its small intestine and penetrate the intestinal wall where sporocysts develop in the outer layer, Cercariae leave the rediae when they are not fully grown and develop freely inside the snail to emerge when fully grown by penetrating its skin; they swim in the water until they contact a fish, the second intermediate host, which they penetrate to encyst as metacercariae in various parts such as the muscle, gill, fin ray, outer intestinal wall, the membrane of the brain, the liver, heart and under the scales; some species also encyst in amphibians. The infection of the definitive host occur with the ingestion of the metacercariac in the second intermediate host.

Cable[2] proposed the name 'opisthorchioid' for all types of cercariae in the superfamily Opisthorchioidea which are similar in morphology, including those of the Heterophyidae. The common features of cercariae are as follows[2,29] : small body usually pigmented with a pair of eyespots, covered with spines, oral sucker armed typically with three transverse rows of per-oral spines, pharynx being present, caeca rudimentary or absent, penetration glands usually seven in pairs with ducts opening to four groups of 3-4-4-3, cystogenous glands numerous dorso-laterally, ventral sucker and genital primordium rudimentary, excretory bladder epithelial variable in shape from saccate to v-shaped, tail longer than body typically with a dorso-ventral finfold.

The cyst of metacercaria is usually small and ovoid. The wall is composed of a thin transparent layer of hyaline material secreted by the cercarial body and usually covered with a thick layer of

Table 1 Species and localities records of heterophyid flukes in man

Species	Localities Record in man	Authority
Apophallus donicus	Oregon	(30)
Centrocestus armatus	Japan	(31)
	Egypt	(32)
C. cuspidatus	Formosa	(33)
C. formosanus	Formosa	(34)
C. longus	Formosa	(35)
Cryptocotyle lingua	Greenland	(5)
Haplorchis pumilio	Formosa	(34)
	Egypt	(22)
	Philippines	(3)
	Thailand	(18)
H. taichui	Philippines	(36)
	Pakistan	(37)
	Formosa	(34)
	Thailand	(15)
H. vanissimus	Philippines	(36)
H. yokogawai	Formosa	(38)
	Philippines	(39)
	Indonesia	(40)
	Thailand	(15)
Heterophyes heterophyes	Egypt	(41)
	Israel	(42)
	Turkey	(43)
H. katsuradai	Japan	(44)
H. nocens	Japan	(45)
Heterophyopsis continus	Japan	(35)
Metagonimus minutus	Formosa	(46)
M. yokogawai	Formosa	(47)
	Japan, Korea	
	Philippines	
	China, Spain	
	Ukraine	
	Rumania	
	East Indies	
Procerovum calderoni	Philippines	(3)
P. varium	Japan	(48)
Pygidiopsis summa	Japan	(49)
Stellantchasmus falcatus	Hawaii	(50)
	Japan	(51)
	Formosa	(38)
	Philippines	(3)
	Thailand	(16)
Stictodora fuscata	Japan	(52)

host reaction tissue. The fully grown heterophyid metacercariae look like young non-ovigerous adults, that is, almost sexually mature.

Most of the heterophyids in man are also found in birds and other mammals but Heterophyes nocens, Metagonimus minutus, Procerovum calderoni, Procerovum varium and Stictodora fuscata have to date been reported in mammals only. Common bird definitive hosts are Milvus migrans, Nycticorax nycticorax, Egretta intermedia, Larus argentatus, Pelecanus onocrotalus and Sterna hirundo which probably are the most easily collected fish-eating birds. The snail host of the heterophyid flukes commonly belongs to the families Thiaridae, Pleuroceridae, Littorinidae and Potamidae. Heterophyid metacercariae are usually found encysted in many families of fish such as Cobitidae, Cottidae, Cyprinidae, Gobiidae, Mugilidae, Ophicephalidae, Percidae, Pleglossidae and Siluridae. These snails and fishes belong to both freshwater and marine species.

อ้างอิง

1. Price EW. A review of the Heterophyoid trematodes, with special reference to those parasitic in man. Inter Congr Microbiol Rep Proc 1940; 446-447
2. Cable RM. Marine cercariae of Puerto Rico. The New York Academy of Sciences. Scientific Survey of Porto Rico and the Virgin Islands 1956; 16 : 495-577
3. Africa CM, de Leon W, Garcia EY. Complications in intestinal heterophyidiasis in man. Acta Medica Philippina, Monographic Series 1940; 1 : 132
4. Wright WH. Animal parasites transmissable to man. Ann NY Acad Sci 1947; 48 : 553-574
5. Witenberg G. Trematodiases in Zoonoses. Van do Hoeden, Amsterdam : Elseveir 1964. 624-626
6. Sprent JFA. Helminth "Zoonoses" : an analysis. Helminth Abstr 1969; 38 : 333-351
7. Cameron TWM. Studies on the Heterophyid Trematode Apophallus venustus (Ransom, 1920) in Canada. Part III. Further Hosts. Canad J Res 1937; 15 : 275
8. Laird M. Distomiasis in Tokelau islanders. Canad J Zool 1961; 39 : 149-152
9. Lopez-Neyza CR, Pozo DG. Nuevo trematode intestinal humano en Europa. Boletin de la Sociedad Espanola de Historia Natural 1932; 32 : 297-304
10. Onji Y, Nishio T. (On intestinal distomes). Iji Shimbun 1916; 949 : 589-593 (In Japanese)
11. Chen HT. Systematic consideration of some heterophyid trematodes in the subfamilies Haplorchinae and Stellantchasminae. Ann Trop Med Parasit 1949; 43 : 304-312
12. Hsu PK. A new trematode of the genus Procerovum from ducks and chickens in Canton (Trematoda : Heterophyidae). Peking Nat Hits Bull 1950; 19(1) : 39-43
13. Pearson JC. A revision of the subfamily Haplorchinae Looss, 1899 (Trematoda : Heterophyidae). I. The Haplorchis group. Parasitology 1964 Nov; 54(4) : 601-676

14. Faust EC. Human intestinal parasites in north China. Am J Hyg 1926 Mar; 9(5) : 505-508
15. Manning GS, Lertprasert P. Four new trematodes of man from Thailand (letter to editor). Trans R Soc Trop Med Hyg 1971 Feb; 65(1) : 101-102
16. Kliks M, Tantachamrun T. Heterophyid (trematoda) parasites of cats in north Thailand, with notes on a human case found at necropsy. Southeast Asian J Trop Public Health 1974 Dec; 5(5) : 547-550
17. Tantachamrun T, Kliks M. Heterophyid infection in human ileum : report of three cases. Southeast Asian J Trop Med Public Health 1978 Jun; 9(2) : 228-231
18. Radomyos P, Bunnag D, Harinasuta T. Haplorchis pumilio (Looss) infection in man in northeastern Thailand. Southeast Asian J Trop Med Public Health 1983 Jun; 14(2) : 223-227
19. Pearson JC, Ow-Yang CK. New Species of Haplorchis from southeast Asia, together with keys to the Haplorchis-group of heterophyid trematodes of the region. Southeast Asian J Trop Med Public Health 1982 Mar; 13(1) : 35-60
20. Seo BS, Rim HJ, Lee SH, Cho SY. Kwack CW, Lee WJ, Yeo TH. Two cases of metagonimiasis with special reference on egg laying capacity in the human host. Seoul J Med 1971; 12 : 234-241
21. Zubov NA, Drozdov VW, Chernova AS. (Clinical picture and pathology of metagonimiasis). Medskaya Parazit 1970; 39 : 392-394 (In Russian)
22. Khalil M. The effect of Heterophyes heterophyes on man. Ann. Rep Research Inst and Endemic Dis Hosp, Ept Public Health, Egypt 1934; 3 : 25-26
23. Gallais P, Paillas P, Collomb P, Luigi DM, Demarchi J, Deschiens R. Etude anatoma-pathologique d'un kyste parasitaire cerebral observe chez I' homme. Bull de la Societe Pathologic Exotique 1955; 48 : 830-832
24. Collomb H, Bert J. Distomasa cerebral avec kystes parasitaires generalises. Revue Neurologique 1957; 97 : 501-506
25. Nakano T, Inuoe M. One human case of intestinal tumour caused by deposited eggs of Heterophyes nocens. Gekano Ryoiki. 1955; 3 : 272-274 (In Japanese)
26. Africa CM, De Leon W, Garcia EY. intestinal Heterophyidiasis with cardiac involvement : a contribution to etiology of heart failure. J Philipp Islands Med Assoc 1935; 15 : 358-361
27. Africa CM, De Leon W, Garcia EY Heterophyidiasis. III. Ova associated with a fatal haemorrhage in the right basal ganglia of the brain. J Philipp Islands Med Assoc 1936; 16 : 22-26
28. Africa CM, De Leon W, Garcia EY. Heterophyidiasis. V. Ova in the spinal cord of man. Philipp J Sci 1937 ; 62 : 393-397
29. Pearson JC. A revision of the subfamily Haplorchinae Looss, 1 1899 (Trematoda : Heterophyidae). II Genus Galactosomum. Philosophical Trans R Soc London 1973 ; 266 : 341-447
30. Niemi DR. Macy RW. The life cycle and infectivity to man of Apophallus donicus (Skrjabin and Lindtrop, 1919) (Trematoda : Heterophyidae) in Oregon. Proc Helminth Soc Washington 1974 ; 41 : 223-229
31. Tanabe H. (Studien uber die Trematoden mit Susswasserfischen als Zwischenwirt. I. Stamnosoma arma-

tum n.g., n.sp.) Kyoto Igaku Zasshi 1922 ; 19 (1) : 1-14

32. Looss A. Notizen zur Helminthologie Aegyptens. Ctbl Bakt 1896 ; 21 : 913-26
33. Faust E C. & Nishigori, M. The life cycles of two new species of Heterophyidae, parasitic in mamals and birds. J Parasit 1926 Feb ; 13 (1) : 91-128
34. Nishigori M. (On a new trematode Stamnosoma formosanum new species and its life history). Taiwan Igakkai Zasshi 1924 ; 234 : 181-228 (In Japanese)
35. Kobayashi H. (Studies on trematodes in Hainan Island. II. Trematode found in the intestinal tracts of dogs by experimental feeding with certain fresh and brackish water fish). Jap J Med Sci Pathol 1942 ; 6 : 187-227
36. Africa CM. Description of three trematodes of the genus Haplorchis (Heterophyidae), with notes on two other Philippines members of this genus. Philipp J Sci 1938 ; 66 : 299-307
37. Kuntz RE. Intestinal protozoans and helminths in U.S. military and allied personnel, Naval Hospital, Bethesda, Maryland. Am J Trop Med Hyg 1960 Sep ; 8 (5) : 561-564
38. Katsuta I. Studies on Formosan trematodes whose intermediate hosts are brackish water fishes. II. Metagonimus minutus new species with mullet as its vector, Taiwan Igakkai Zasshi. 1932 ; 31 : 26-39. (In Japanese, English summary).
39. Africa CM, Garcia EY. Heterophyid trematodes of man and dog in the Philippines with descriptions of three new species. Philipp J Sci 1935 ; 57 : 253-267
40. Lie KJ. Some human flukes from Indonesia. Docum Neerl. Indones Morb Trop 1951 ; 3 : 105-116
41. Von Siebold CT. Beitrage zur Helminthographia Humana. Zeitschr Wiss Zool 1853 ; 4 (1) : 62-64
42. Witenberg G. Studies on the trematode-family Heterophyidae. Ann Trop Med Parasit 1929 Jun; 23 : 131-239
43. Kuntz RE, Lawless DK, Lang Behn HR. Intestinal protozoa and helminths in the people of western (Anatolia) Turkey. Am J Trop Med Hyg 1958 May ; 7 (3) : 298-301
44. Ozaki Y, Asada J. A new human trematode, Heterophyes Katsuradai new species. J Parasit 1925; 12: 216-218
45. Onji Y, Nishio T. (On a new species of trematodes belonging to the genus Heterophyes). Iji Shimbun 1961 ; 954 : 941-946 (In Japanese).
46. Hsieh HC. Outline of parasitic Zoonoses in Taiwan. Formosan Sci 1959 ; 13 : 99-109
47. Yamaguti S. Synopsis of Digenetic Trematodes of Vertebrate. Vol 1. Tokyo : Keigaku Publishing, 1971. 620-637, 789-813
48. Aokage K. (Studies on the trematode parasites of brackish water fishes in Chugoku coast of Setonaikai). Toyko Iji Shinshi. 1959 ; 73 : 217-224 (In Japanese)
49. Kobayashi H. Recent researches on Japanese fishes which serve as the intermediate host of helminths. Proceeding of the 5 Pacific Science Congress (Canada, 1933) 1934 ; 5 : 4156-463
50. Alicata JE, Schattenberg OL. A case of intestinal heterophyidiasis of man in Hawaii. JAMA 1938 Apr ; 110 (14) : 110-1101
51. Kagei N, Oshima T, Ishikawa K Kihata M. Two cases of human infection with Stellantchasmus falcatus Onji & Nishio, 1951 (Heterophyidae)

in Kochi Prefecture. Jap J Parasit 1964 ; 13 : 472-478 (In Japanese).
52. Hasegawa T. Uber die enzystierten Zerkarien in Pseudorasbora parva. Okayama Igakki Zasshi 1934 ; 46 (533) : 1397-434 (In Japanese, German summary).

จุฬาลงกรณ์เวชสารได้รับต้นฉบับเมื่อวันที่ 1 เดือน กรกฎาคม พ.ศ. 2528