Research Square

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A New Standard of Care? Evaluating Postoperative Dapsone Therapy

A H M DELWAR

mamun.delwar196@gmail.com

Comilla Medical College https://orcid.org/0000-0001-7941-1301

Research Article

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Abstract

Background

Rhinosporidiosis is a chronic inflammatory disease frequently occurring in Asia. Surgery is the mainstay of treatment. About 48% of postoperative patients experience recurrence. To prevent recurrence, dapsone is now recommended. Our study aims to determine the appropriateness of dapsone therapy to prevent recurrence of rhinosporidiosis.

Methods

A survey of 101 patients in the two tertiary care hospitals, Cumilla, Bangladesh, from 15 july, 2016 to 30 June, 2022. Diagnostic nasal endoscopy (DNE) was performed at every step for provisional diagnosis of rhinosporidiosis. Here, 60 patients were treated with dapsone, and 41 were not.

Results

Males (81.2%) suffered more than females (18.8%). The age range was 5–14 years (38; 37.63%), followed by 15–24 years (30; 29.70%). Rural (85.1%) and poor (70.3%) were more affected. Children were 50 (49.5%) (Age < 18 years), and adults were 51 (50.5%) (Age ≥ 18 years). 26.7% (27) were recurrent cases; postoperative treatment with dapsone was 60 (59.4%); and 41 (40.6%) were not receiving dapsone. Recurrence without dapsone was 5; 4.95%, and with dapsone, 1; .99%. The odds ratio between the two groups was evaluated using binary logistic regression: age odds ratio = 1.105 (1.009–1.210), P=.032. sex odds ratio = .260, .045 = 1.485, P=.130, number of operations odds ratio= .038, .001-.989, P=.052. treatment with dapsone odds ratio = 164.246, 11.736 = 2298.629, P = < .001, and follow-up time in months odds ratio = 1.081, 1.035–1.130, P < .001.

Conclusion

A positive trend in cure was observed across age groups, treatment with dapsone, and follow-up time; a negative trend was observed for sex and the number of operations in postoperative dapsone therapy for rhinosporidiosis.

1. Introduction

It is a long-lasting granulomatous disease caused by Rhinosporidium kinealyi or Rhinosporidium seeberi, related to aquatic protozoans, and affects humans and animals [1]. It is endemic in India, Sri Lanka, Pakistan, and Bangladesh. Some cases have been reported from Africa, South and North America, Europe, and Canada. No case report has been made from Australia [2]. The disease is also seen to involve animals such as cows, bulls, horses, mules, and dogs when men and animals share the same infected pond, rivers, canals, etc. [3]. It was previously considered a fungus; now, it is a protozoan or related to the fish parasite [4]. The sporangia are scattered in the vascular and fibromyxomatous polypoid tissue [5]. These are oval or round chitinous cysts full of spores that burst through the cyst's

germinal pore. Rhinosporidiosis presents in four clinical types: 1. Nasal and related organs, 2. Ocular 3. Cutaneous, and 4. Disseminated [6]. A bleeding, red raspberry-like polyp of the nasal mucosa is the presenting sign [6]. The disease mainly affects the nose and nasopharynx; other sites are the lips, palate, conjunctiva, epiglottis, larynx, trachea, bronchi, skin, vulva, and vagina [7, 8]. Anterior rhinoscopy shows:1. A leafy polypoidal mass. 2. Pink to purple in color. 3. Attached to the lateral wall or the nasal Septum. 4. The mass bleeds on touch. 5. Its surface is studded with white dots representing the sporangia of a fungus [9]. Sometimes, it extends to the nasopharynx and hangs behind it. Diagnosis is confirmed by excision biopsy and histopathology [10]. Complete excision and broad base cauterization of the mass prevent most recurrences [11]. Recurrence may occur after excision [12]. Dapsone, an anti-leprosy drug, has been given for six months to prevent recurrence [13]. Anti-leprosy drugs cause bone marrow depression. So, a follow-up blood count is necessary every month.

2. Methods

2.1 Experimental Outline:

It was a prospective observational study involving 101 patients recruited from two tertiary care hospitals, namely Comilla Medical College Hospital (https://comc.college.gov.bd) and Cumilla Medical Center PVT LTD (http://www.cumillamedicalcenter.com), situated in Cumilla, Bangladesh, spanning from 15 July 2016 to 30 June 2022. As it was an observational study, a clinical trial number was not applicable, and the necessary registration details were not applicable. The research population comprised patients from the ENT outpatient and inpatient departments of both institutions. Ethical endorsement was obtained from the institutional ethics review board, with memo number CoMC / IERB / 2016 / 52, dated 20 September 2016, in accordance with the Declaration of Helsinki, 1964, and the revised documentation from Fortaleza, 2013. Approved by the ethical committee headed by Professor Md Mohsinuzzaman Chowdury, Principal; Member Secretary Dr Mohammad Izazul Hoque, Associate Professor and Head of Hepatology; Members were Head of the Department of Medicine, Pediatrics, Surgery, Gynecology and Obstetrics, and Otolaryngology, Comilla Medical College, Bangladesh in the year 2016.

According to the declaration, the primacy of the subject, informed consent, risk-benefit assessment, protection of vulnerable groups, scientific integrity, and publication were maintained. Written informed consent was obtained from patients and their immediate relatives; for pediatric patients, parental consent was acquired. Given the high recurrence rate of rhinosporidiosis, this information was thoroughly conveyed to patients, parents, and relatives. Rhinosporidiosis should be diagnosed clinically. Diagnostic nasal endoscopy (DNE) was performed using rigid Hopkins rods 0^0 and 30^0. Figure 1is the endoscopic view of nasal rhinosporidiosis, and Fig. 2 is an endoscopic view of laryngeal rhinosporidiosis. Preoperative biopsy was avoided due to the risk of uncontrollable epistaxis despite nasal packing. History, clinical examination, and investigative findings supported a provisional diagnosis of rhinosporidiosis. The patient presented with recurrent epistaxis and a red, fleshy, polypoid mass that bleeds upon probing. Radiological investigations—including X-ray of the nose and PNS (paranasal sinuses) and computed tomography (CT) scan were performed to differentiate rhinosporidiosis from

other disease conditions and exclude other nasal masses. X-ray findings were vague, with soft-tissue compaction within the nasal cavity, wall, or floor; borders were regular or irregular; mucosal thickening may be found in the same sinuses; and the bony outline was regular. Bilateral findings, often observed in recurrence cases, can occur. CT scans revealed a moderately enhancing, lobulated soft-tissue mass within the nasal cavity, predominantly on the lateral wall, with preserved bony margins. Postoperative histopathological examination involved routine hematoxylin and eosin (H&E) staining, revealing wide, bulky-walled sporangia at all steps of maturation embedded within hyperplastic, vascularized subepithelial stroma, as shown in Fig. 3. In this paper, unconditioned variables were sex, age category, socioeconomic status (SES), residential status, number of operations, dapsone treatment, and outcomes. Continuous variables included age (years) and follow-up duration (months).

2.2 Inclusion and Exclusion Criteria:

All included patients will be clinically diagnosed with rhinosporidiosis and will voluntarily consent to participate in the survey. Bleeding nasal tumors, such as bleeding hemangioma, inverted papilloma, angiofibroma, squamous cell carcinoma, adenocarcinoma, and hemangiopericytoma, were excluded from the study. Cases initially diagnosed as a rhinosporidiosis but reported after histopathology as other tumors or bleeding polyps, immunocompromised patients, pregnant women, and those who refused to engage in the study were also excluded from the study.

2.3 Patient Selection and Treatment Method:

Patient collection started from the ENT outpatient department. In the outpatient department, any suspected rhinosporidiosis patient was collected by an outdoor medical officer and sent to the resident surgeon (RS) of the ENT to clarify the patient's diagnosis by DNE. Afterward, the patient was advised for radiological investigation: a Waters view X-ray of the nose and paranasal sinuses. The radiologist reported the X-ray. As it was a prolonged cohort study, the different radiologists were posted during the period. CT scan was performed only on adult patients to delineate the extension of the mass and bony erosion, and on pediatric patients suspected of having juvenile nasopharyngeal angiofibroma, rhabdomyosarcoma, or nasopharyngeal carcinoma. As with the X-ray report, the CT scans were interpreted by different radiologists on duty at the time. After that, the patient underwent the investigations needed for anesthetic and surgical fitness. These included complete blood count (CBC), bleeding time, clotting time, random blood sugar (RBS), serum creatinine, serum HBsAg, urine R/M/E (routine and microscopic examination), chest X-ray p/a view, and ECG for every patient, and ECHO (echocardiography) for patients over 30 years of age. If everything was alright, RS sent the patient to the inpatient department for admission. The assistant registrar received the patient and again took the history and chief complaints. All were written in the history sheet, which was readily printed by the hospital authority. All systemic examination and special ENT examination, including DNE and rigid laryngoscopy with rigid Hopkins 700, were performed again. The ENT registrar filled in all documents in the sheet, which was ready for the present study. Afterward, the professors, who may be assistants, associates, or professors designated for duty at that time, reviewed the patient history, examination, and investigation. They also again performed DNE and rigid laryngoscopy to confirm the probable diagnosis.

The patient was sent to the anesthesia department for a preoperative preanesthetic check-up after filling out the preanesthetic form, which the anesthesia department had already printed. The anesthesia department designated an anesthetist for the preanesthetic check-up, who reviewed all investigations for general anesthesia. If the patient is fit for anesthesia, the anesthetist signs the form. The operation was performed by any of the posted ENT department trainees, such as RS, Assistant Registrar, or Registrar, under the guidance of an assistant, associate, or professor on duty that day. Some recurrent cases were operated on by professors to achieve precise excision, thereby reducing the recurrence rate.

2.4 Interventional Plan:

Treatment of rhinosporidiosis is solely surgical, including mass excision with a cautery and wide-based cauterization to prevent recurrence. Preoperative medication was given only to those who were suffering from comorbid conditions like hypertension, diabetes mellitus, and bronchial asthma. The patient was referred to the medicine, diabetology, and chest specialists to manage the comorbid conditions. For precise excision, we used an endoscope, and before cauterization, the stalk of the mass was identified with a cotton-covered Jobson-Horn probe. Usually, precise, complete excision of the mass in rhinosporidiosis was bleeding-free and required no nasal packing. After excision, the mass was sent for a histopathological testing to confirm the diagnosis of rhinosporidiosis. There are various histopathologists in the Comilla Medical College pathology department and in private histopathology centers. In the pathology department, they have scheduled a designated dates for histopathology, and poor patients can complete the histopathology at a low cost. Some patients need a special opinion; their tissue was sent to the private center, and some patients willingly go to the private center for histopathology of those patients operated at Cumilla Medical Center Pvt Ltd. So, the report was done by a different histopathologist, and in the pathology department of Comilla Medical College, some trainees compiled the report.

2.4 Follow-up Schedule and Consequences:

A printed follow-up schedule was provided to the patient. The perioperative healing period was 15 days; thereafter, the patient's follow-up schedule was at 1, 3, 6, and 12 months, and the dapsone-treated patient was advised monthly for 6 months, then every year. For a dapsone-treated patient, a CBC was performed at monthly follow-up visits. Before starting dapsone, we measured the patient's serum glucose-6-phosphate dehydrogenase (G6PD) level. Full blood count (CBC) and liver function investigation (LFTs) were performed monthly after postoperative dapsone therapy. Hemolytic anemia occurs more severely in a person with G6PD deficiency, methemoglobinemia causes cyanosis and respiratory distress, and agranulocytosis occurs within the first three months of treatment. Dapsone hypersensitivity syndrome (DRESS syndrome, Drug Reaction with Eosinophilia and Systemic Symptoms) is a severe idiosyncratic reaction characterized by fever, skin rash, jaundice, and elevated liver enzymes, leading to immediate discontinuation of the drug. The drug is advised at 100mg daily for the adult patient, sometimes 50 mg two times daily for six months, and 1–2 mg/kg/day orally for children, not more than 100 mg daily.

2.5 Hypothesis and Statistical analysis:

In descriptive statistics, we examine categorical variables by frequency and proportion, and measurable variables by mean, median, mode, and standard deviation. After evaluating the study's validity, we test the null hypothesis using inferential statistics and a significance test to either support or refute it. Binary logistic regression was performed to judge the threat of the disease using the odds ratio. Cox regression was performed to estimate the hazard ratios for the disease. A univariate model was fitted to estimate the risk and benefit of dapsone therapy after the operation. All data were analyzed in SPSS version 31. Results were considered significant at a < 0.05.

3. Results

3.1 Participant features according to intervention:

Participant documents, clinical examination reports, and investigations are significant components for decision-making about operations. The high recurrence rate of rhinosporidiosis affects surgical procedures. We added an endoscope for precise excision with a diathermy knife. The children's groups were more vulnerable to recurrence. This is because they often bathe in ponds, rivers, and canals without their parents knowing. Here, the children were 50; 49.5% (Age < 18 years), and adults were 51; 50.5% (Age ≥ 18 years). They did not follow the postoperative advice to prevent recurrence. Socioeconomic and residential status, poor 71; 70.3%, and rural 62; 61.39%, impact the outcome of surgery and dapsone treatment. Due to the distance to the hospital, they cannot follow up regularly. Therefore, recurrence is more common among the rural poor.

3.2 Relapse and Survival:

The overall survival (OS) rate was 100%, and the disease-free survival (DFS) was 4.5 years. Figure 1 shows an endoscopic view of nasal rhinosporidiosis, Fig. 2 shows an endoscopic view of laryngeal rhinosporidiosis, and Fig. 3 shows the normal histopathological slide of rhinosporidiosis. Demonstrative statistics presented the explicit variables in frequency and percentage, such as sex (female and male), different age groups were 5–14 years, 15–24 years, 25–34 years, 35–44 years, 45–54 years, and 55–70 years, socioeconomic status was poor, lower middle, upper middle, residential status was rural, suburban, urban, number of operations was divided into first or one operations, who's had first time exposure to disease, recurrence cases who's had exposure of disease before and got operative treatment of anywhere else, number of patients treatment with dapsone or not, and outcome of dapsone treatment (Table-1). Perpetual factors were expressed as mean, standard deviation, minimum, and maximum, including participant age; follow-up times after operations; and dapsone therapy (Table 2). The binary logistic regression adjusted 95% C.I. for the odds ratio (Exp(B)) between two groups across different variables: age's odds ratio = 1.105 (1.009–1.210), P=.032. sex odds ratio = .260, .045 = 1.485, P=.130, number of operations odds ratio= .038, .001-.989, P=.052, treatment with dapsone odds ratio = 164.246, 11.736 = 2298.629, P < .001, and follow-up time in months odds ratio = 1.081, 1.035–1.130, P < .001, in which the dependent variable was the outcome of dapsone therapy (Table 3). Cox regression analysis of various variables to estimate hazard ratios, with time as the follow-up period after the

operation and dapsone therapy: age of the participant, p=.063>.05, HR = 1.047, .997 = 1.100, different age categories in years (1), p=.043<.05, HR = 1.911, 1.019–3.548, number of operations, p=.803>.05, HR=.910, .433 = 1.911, treatment with dapsone, p = < .001<.05, HR = 4.242, 1.937 = 9.387, outcome of dapsone therapy, p = < .001, HR=.161, .069=.373 (Table-4). Figures 4 and 5 showed a Cox regression survival curve and hazard curve. The dependent factor in the univariate assessment was the follow-up time, which showed a significant effects of dapsone therapy (p=.010); ses*treat dapsone (p=.015); treat dapsone*outcome (p=.048); and ses*reside*treat dapsone (p=.040 (Table-5).

3.3 Possible danger for relapse following postoperative dapsone therapy:

Sex (male 56; 55.4%), children and young adults (5–24 years; 67.33%), poor (70; 70.3%), and rural (62; 70.3%) were the most vulnerable groups for relapse. Males were working out from home early in the morning, outside from home far away from the village, and mothers were busy with homework. Therefore, parents do not properly care for their children. Most children and young adults were growing without proper care and control in poor, rural areas. Risk estimation in the Chi-Square test showed an odds ratio for sex = .408; .131-1.269, for cure = .813;.591-1.119, for recurrence = 1.992; .870-4.562, an odds ratio for residential status = .624; .129-3.033, for cure = .926; .740-1.159, for recurrence = 1.483; .381-5.769, an odds ratio of number of operation=.041;.005-.315, dapsone treatment = .533;.422-.674, no treatment = 13.135; 1.892–91.178, an odds ratio for number of operation=.120;.015-.945, for cure=.786; .677-.912, for recurrence = 6.568; .921-46.853, an odds ratio for dapsone treatment = 15.492; 4.101–58.523, cure = 1.679; 1.261–2.236, recurrence=.108; .034-.347.

Table 1
Frequency and Percentage of Categorical Variables:

Serial Number	Variables	Allocation	Frequency	Percentage
1	Sex	Female	45	44.6%
		Male	56	55.4%
		Total	101	100%
2	Different age groups	5–14 years	38	37.63%
		15–24 years	30	29.70%
		25–34 years	15	14.85%
		35–44 years	6	5.94%
		45–54 years	9	8.91%
		55–70 years	3	2.97%
		Total	101	100%
3	Socioeconomic status	Poor	71	70.3%
		Lower Middle	25	24.75%
		Upper Middle	5	4.95%
		Total	101	100%
4	Residential Status	Rural	62	61.39%
		Suburban	36	35.64%
		Urban	3	2.97%
		Total	101	100%
5	Number of Operations	One operation	74	73.3%
		More than one operation	27	26.7%
		Total	101	100%
6	Treatment with Dapsone	Yes	60	59.4%
		No	41	40.6%
		Total	101	100%

Serial Number	Variables	Allocation	Frequency	Percentage
7	Outcome of Dapsone therapy	Cure with dapsone therapy	59	58.42%
		Cure without dapsone therapy	36	35.64%
		Recurrence after dapsone therapy	1	.99%
		Recurrence without dapsone therapy	5	4.95%

Table 2
Mean, Std. Deviation, minimum, and maximum of Continuous Variables:

Factors	Age in years	Follow-up times in months
Mean	22.59	37.97
Std. Deviation	13.879	21.902
Minimum	5	6
Maximum	70	72

Table 3
Binary Logistic Regression: Dependent Variable was the Outcome of Dapsone Therapy:

Factors	S.E.	df	Sig.	Odds ratio	95% C.I. For Odds ratio	
					Lower	Upper
Age of the participant	.046	1	.032	1.105	1.009	1.210
Sex of the participant	.890	1	.130	.260	.045	1.485
Number of operations	1.685	1	.052	.038	.001	1.033
Treatment with dapsone	1.346	1	< .001	164.246	11.736	2298.629
Follow-up time in months after operation and dapsone therapy	.023	1	< .001	1.081	1.035	1.130

Table 4
Cox Regression Analysis: Time was the Follow-up for the Patient:

Factors	SE	df	Sig.	Hazard ratio	95% C.I.	For the hazard ratio
					Lower	Upper
Age of the participant	.025	1	.063	1.047	.997	1.100
Overall age categories		5	.003			
Different age categories (1)	.321	1	.043	1.911	1.019	3.584
Number of operations	.378	1	.803	.910	.433	1.911
Treatment with dapsone	.400	1	< .001	4.242	1.937	9.287
Outcome of dapsone therapy	.429	1	< .001	.161	.069	.373

Table 5
Univariate Analysis of the Variance: Dependent Variable: Follow-up Time

Source	F	Significance
Outcome of dapsone therapy	6.938	.010
ses*Treat_dapsone	6.233	.015
Treat_dapsone*Outcome	4.041	.048
Ses*reside*Treat_dapsone	4.340	.040

4. Discussion

4.1 Sex of the Participant:

Gender or sex is accounted in research as a fundamental to health equity and medical precision. Sex is recorded as a biological variable (SABV). The drug produces opposing drug metabolism or neural pathways in male versus female subjects. Sex influences disease incidence, progression, and outcome across every medical condition. In the present study, males (55; 55.4%) outnumbered females (45; 44.6%), consistent with others' research. However, the binary logistic regression was not significant, with P = 0.130, odds ratio = 0.260, 95% Confidence interval (CI): .045-1.485. Karthikeyan P. (14) showed that males (18; 56.25%) were more predominant than females (14; 43.75%). Dutta M. (15) reported that males (23; 58.97%) were the predominant group among patients with rhinosporidiosis, compared with females (16; 41.03%). Mathew S. (16). Research revealed that males (48; 87.27%) were the predominant group in rhinosporidiosis, compared with females (7; 12.73%). Chandran M. (17) found that males (26; 83.87%) were the dominant group, matching females (5; 16.13%). In a developing country like

Bangladesh, men are working outside in rural areas. This means that a large proportion of females engage in household chores like cleaning rooms and homes, cooking, washing clothes, and caring for children. The main professions of males are farming, cattle raising, gardening, daily labor, fishing, and road and house building. Some males went to urban towns to search for work, such as driving an auto rickshaw, working as a van driver, or as a daily laborer. After work, they bathe in the canals, ponds, and rivers, where cattle are also used to clean them. Females work mainly in the house, but they use common ponds for bathing, where cattle are also used to clean them. So, females suffer less than males.

4.2 Age of the Participant:

Our work indicated the participant's age. Here, age was expressed in two ways: as age categories (an ordinal variable) and as age in years (a continuous variable). The mean and SD of age were 22.59 ± 13.872 years, with a range of 5–70 years. Across age groups, the 5–14 years age group was the most vulnerable to rhinosporidiosis (38; 37.63%), and the 15–24 years age group was the second most vulnerable (30; 29.70%). Children were 50 (49.5% (Age < 18 years), and adults were 51 (50.5%) (age > 18 years. The binary logistic regression assessment was significant in the age category, with P = 0.032, odds ratio = 1.105, 95% CI:1.009–1.210. Cog regression evaluation of age in years was not meaningful with P = 0.063, hazard ratio = 1.047, 95% CI:0.997-1.100, but overall age category was significant with P = 0.003, and the 5–14 years group 1 was also notable with P = 0.043, hazard ratio = 1.911, 95% CI: 1.019–3.584. Karthikeyan P. (14) showed that patients aged 21–50 years were the most affected, which is not consistent with our study, which reported a range of 8–74 years. Dutta M. (15) reported that 18 (46.15%) were < 15 years and 21 (53.85%) were ≥ 15 years, findings similar to ours. Mathew S. (16) Research revealed that the highest age category was 11–20 years (20; 36.36%), followed by 21–30 years (17; 30.91%), which did not resemble our study; the mean age was 25.17 years, with a range of 5–70 years, corresponding with our reports. Chandran M. (17) reported that the largest number of patients was in the 10-20-year age group (31 patients), unlike our paper. Chowdhury N.K.'s (18) study reported a peak age range of 11–20 years (14; 28%), followed by 21–30 years (11; 22%), which is not comparable to our study.

4.3 Socioeconomic and Residential Status:

Salary, assets, learning, and employment comprised the economic status in society. They are a comprehensive assessment of an individual's or family's economic and social position relative to others. Socioeconomic status and income levels differ in access to health facilities; higher income and status are associated with greater access to quality health facilities than those of lower status. In the lower-income group, healthcare is often reactive or emergency-based due to higher costs. In the higher-income group, healthcare includes frequent routine checkups, screenings, and early intervention before conditions worsen. Due to geographical locations, rural poor people have a long distance to the clinic with less support for transport, or wait long times to receive treatment; on the other hand, high-income urban people have greater capacity to advocate for specialized treatment, second options, and advanced therapies. The Kuppuswamy scale and BG Prasad scale are based only on family income, in both urban

and rural populations [19]. Residential geography or urbanicity refers to the classification of the study population based on where, how, or under which conditions they live. Depending on the study, residential status functions as a demographic variable. It can be expressed as an inclusion or exclusion criterion, or a confounder. A confounding factor is an external component that influences both the independent and dependent factors. It is used to evaluate rural-urban disparities, healthcare access, and environmental exposures. Urban, suburban, or rural residential status captures access to specialty care, environmental pollutants, and baseline health infrastructure. The current study found that the patients' highest socioeconomic status was poor (71; 70.3%) out of 101, and that they lived in a rural area (62; 61.4%). Only 5% were upper-middle, and 3% lived in urban areas. The remaining patients were lower-middle-class and suburban, near-poor, and in the village group. This paper showed that most patients lived in rural areas and had low socioeconomic status. Univariate assessment of SES and residence with dapsone treatment showed notable results: SES*treat dapsone, P = 0.015, and SES*reside*treat dapsone, P = 0.040. Here, poor and rural parents were busy earning money to fulfill their everyday needs. Children live carelessly and bathe and swim randomly in the nearest ponds, canals, and rivers. The prime cause of rhinosporidiosis is bathing in the ponds, canals, and rivers, where the same ponds, canals, and rivers are used to clean the cattle, as supported by Chowdhury N.K.'s (18) study; they reported that 46 (92%) out of 50 had a history of bathing in the ponds, canals, and rivers. Dutta M. (15) reported 97.44%; 38 out of 39, Karthikeyan P. (14) recorded 96.88%; 31 out of 32 had a history of bathing in reservoirs, rivers, and ponds, Chandran M. (17) documented 31; 100% had a pond bathing history, which had 96.8%; 30 out of 31had a history of animal bath in the same ponds. Mathew S (16) stated that all patients had a history of pond bathing. Karthikeyan P. (14) showed that low socioeconomic status was 24 (76%), middle class 8(24%), and no high class, similar to our paper. Dutta M. (15) reported that 32 (82.05%) were living in rural areas, and 7 (17.95%) in urban areas, which is consistent with our study, and the backward class were 22 (56.41%), the general class 17 (43.59%), which supports our report. Mathew S. (16) found that a larger number of patients were from the village (45; 81.82%), and 51 (92.73%) were poor, out of 55, which supports our study. Chowdhury N.K.'s (18) study revealed that most of the patients were from rural areas (37; 74%), suburban 09 (18%), and urban 04 (8%), and had low socioeconomic status (27; 56%), middle (22; 44%), and high 01 (2%), corresponding to our research.

4.4 Number of Operations:

Our paper documented that the new cases accounted for 74 (73.3%) and recurrent cases for 27 (26.7%). Patients with a history of previous operation for rhinosporidiosis were recorded as recurrent cases, and those who presented for the first time with rhinosporidiosis were fresh or new cases. The binary regression analysis of the number of operations was not significant with P = 0.052, odds ratio = 0.038, 95% CI:0.001–1.033. Cox regression assessment was not significant (P = 0.803), because the hazard ratio was 0.910 (95% CI: 0.433–1.911). Dutta M. (15) reported that recent patients were 34 (87.18%), and recurring patients were 5 (12.82%), which is similar to our report. Mathew S. (16) revealed that fresh participants were 45 (81.82%), and recurrent cases were 10 (18.18%). Chandran M. (17) analyzed that new cases were 19 (61.2%), and recurrent cases were 12 (38.8%). Chowdhury N.K.'s (18) study revealed

that the original cases numbered 26 (52%) and the repeated cases numbered 24 (48%). All paper reports were consistent with our study.

4.5 Treatment with Dapsone and Recurrence:

Dapsone is an anti-leprosy drug. It has been used for six months to prevent the recurrence of rhinosporidiosis. The important side effects are bone marrow depression, leading to pancytopenia, which causes fatigue, infections, and bleeding. Therefore, the patient should have a complete blood count every month as part of follow-up. The current study reported that 60 (59.4%) postoperative patients were treated with dapsone and completed 6 months without side effects, while 41 (40.6%) did not receive dapsone. The nonrecurrent cases of children were not treated with dapsone therapy. Due to the significant hematological side effects associated with dapsone—such as hemolytic anemia, methemoglobinemia, and agranulocytosis, which reduce white blood cell counts and predispose children to severe infections—the decision was made to restrict its use to children with recurrent disease only, thereby balancing the potential benefits and risks.

The current paper reported a cure rate of 58.42 (59) with dapsone therapy, while the cure rate without dapsone treatment was 35.64% (36). The overall cure rate was 94.06% (95). The overall recurrence rate was 5.94% (6). The recurrence rate after dapsone therapy was 0.99% (1). The patient's age was 70 years. He also had dementia. After medical advice to avoid pond bathing, he again started pond bathing and reported a disease recurrence. Recurrence without dapsone therapy was 4.95% (5). Four patients were children (age < 18 years), and one was an adult. They are all in rural areas and sometimes use ponds for bathing. So, we concluded that dapsone therapy reduces the recurrence rate from 4.95% to .99%. The binary logistic regression showed that dapsone treatment was highly significant (P < .001), with an odds ratio of 164.246 (95% CI: 11.736-2298.629). The Cox regression analysis of the dapsone treatment report was highly significant (P < .001), with a hazard ratio of 4.242 (95% CI: 1.937–9.287). Univariate evaluation showed that dapsone treatment was significant (P = 0.010), and dapsone treatment*outcome was also significant (P = 0.048). Karthikeyan P. (14) reported that 2 of 32 patients (6.25%) presented with recurrence. Dutta M. (15) accounted for a 13% recurrence rate, with 5 patients out of 39, whose occupation was farmer. Mathew S. (16) noted a recurrence rate of 18.18% (10 out of 55). Arseculeratne SN [20] documented that the anti-leprosy drug dapsone is the best clinically reported anti-rhinosporidial agent. Nair KK.'s [21] case-control study showed a decrease in the recurrence rate from 93% to 39% with postoperative dapsone therapy, consistent with our paper. Job A.'s [22] paper determined that the oral adult dose for postoperative rhinosporidiosis was at least 100 mg/day for 6 months. Sometimes treatment may need to be prolonged for a year. Janardhanan J. [23] reports that most patients were cured by surgical excision followed by dapsone therapy. Nair K.K.'s [21] statement revealed that antimicrobial compounds, diaminodiphenyl sulfone (SDD) or dapsone, are better drugs for post-excision rhinosporidiosis to prevent recurrence. Kaushal S. [24] reported that dapsone is the most desirable drug for treating post-excision infection and preventing recurrence. Most papers suggest that precise endoscopic excision and postoperative dapsone therapy for at least 6 months dramatically reduce recurrence, which is consistent with our study.

4.6 Follow-up the Patient:

A postoperative follow-up schedule is essential for better treatment outcomes, especially in case of recurrent disease. The ongoing study exhibited that the mean follow-up was 37.97 ± 21.902 months, ranging from 6–72 months. DNE was done at every follow-up. Binary logistic regression was highly notable (P<.001), with an odds ratio of 1.018 and 95% CI: 1.035–1.130. In a Cox regression and univariate analysis, follow-up time was used as a dependent variable. Here, the dapsone-treated patient was advised monthly for six months and then for one year, and other patients for 1, 3, 6, and 12 months. Karthikeyan P. (14) had a follow-up schedule after the operation up to 12 months. Dutta M. (15) had a one-year follow-up. Mathew S. (16) noted that their retrospective study was for two years. Chandran M. (17) analyzed the rhinosporidiosis patient for six months. Chowdhury N.K.'s (18) study reported follow-up periods of two weeks, one month, three months, six months, and one year. The foremost study had a follow-up schedule, and it was almost like our work.

5. Conclusion

Rhinosporidiosis is a notorious disease that occurs in underprivileged people who are not aware of the disease. Simple awareness and self-knowledge may save thousands of people. Both government and non-government organizations help protect poor villagers from the disease. Recurrent cases should prompt a change in their profession from waterborne. After surgical treatment, the burden on poor people is reduced. But recurrence increases the patient burden and diminishes the surgeon's confidence. So, indefinite follow-up with dapsone therapy is recommended for post-surgical patients.

Limitations:

The highest proportion of patients were poor and rural. Some investigations were funded by support from our departmental poor fund, which our departmental doctors raised. CT scan and histopathology were done in the government medical college for some patients, which has a poor fund to support them. Also, in follow-up, some patients did not properly maintain their schedule. These were all our limitations.

Some proposals and recommendations:

1. Health awareness about rhinosporidiosis in the rural and poor population reduces the recurrence and new cases of the disease.
2. Government and nongovernment organizations take the initiative at the community and village levels to decrease the prevalence of rhinosporidiosis.
3. Further research is needed on postoperative dapsone therapy in rhinosporidiosis to assess the treatment success and overcome the side effects and failure of this drug.

Declarations

Conflict of Interest:

None declared.

Funding:

None

Ethical Approval:

Approved by the ethical committee headed by Professor Md Mohsinuzzaman Chowdury, Principal; Member Secretary Dr Mohammad Izazul Hoque, Associate Professor and Head of Hepatology; Members were Head of the Department of Medicine, Pediatrics, Surgery, Gynecology and Obstetrics, and Otolaryngology, Comilla Medical College, Bangladesh in the year 2016.

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26. Rashid DMS, Glasgow MBBSFCPSMSFRCS), FACS (USA). Professor and Head of Otolaryngology and Head-Neck Surgery, Comilla Medical College, Cumilla, Postcode: 3500, Bangladesh. Email:

drsajiburrashid@gmail.com

27. Dr Md Arif Morshed Khan MBBS, FCPS. Associate Professor of Otolaryngology and Head-Neck Surgery, Comilla Medical College, Cumilla, Postcode: 3500, Bangladesh. Email: arifkhan.doc@gmail.com
28. Uddin DMZ MBBS, DLO. Registrar of Otolaryngology and Head-Neck Surgery, Comilla Medical College Hospital, Cumilla, Postcode: 3500, Bangladesh. Email: zakiuddinent@gmail.com
29. Rahman DMZ MBBS, DLO. Assistant Registrar of Otolaryngology and Head-Neck Surgery, Comilla Medical College Hospital, Cumilla, Postcode: 3500, Bangladesh. Email: zillur.dr.cmc@gmail.com
30. Dr Md Taslim Uddin Miah MBBS, DLO. Assistant Registrar of Otolaryngology and Head-Neck Surgery, Comilla Medical College Hospital, Cumilla, Postcode: 3500, Bangladesh. Email: em2taslim@gmail.com
31. Dr Md Belal Hossain, MBBS, DLO
32. Resident Surgeon of Otolaryngology and Head-Neck Surgery Comilla Medical College Hospital, Cumilla, Postcode: 3500, Bangladesh. Email: dr.belalhossain11@gmail.com

Figures



Figure 1

Endoscopic view of Nasal Rhinosporidiosis.

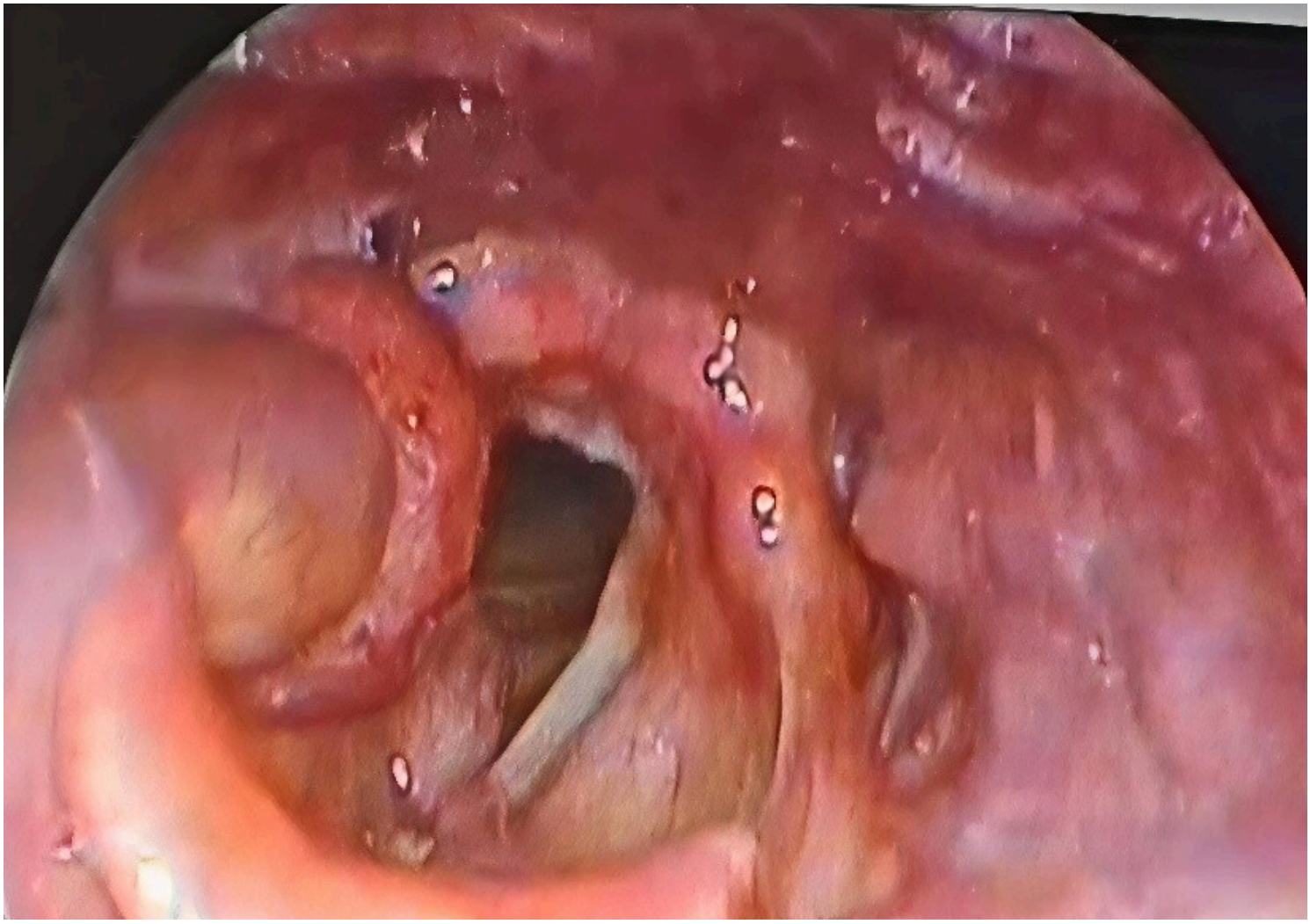


Figure 2

Endoscopic view of Laryngeal Rhinosporidiosis.

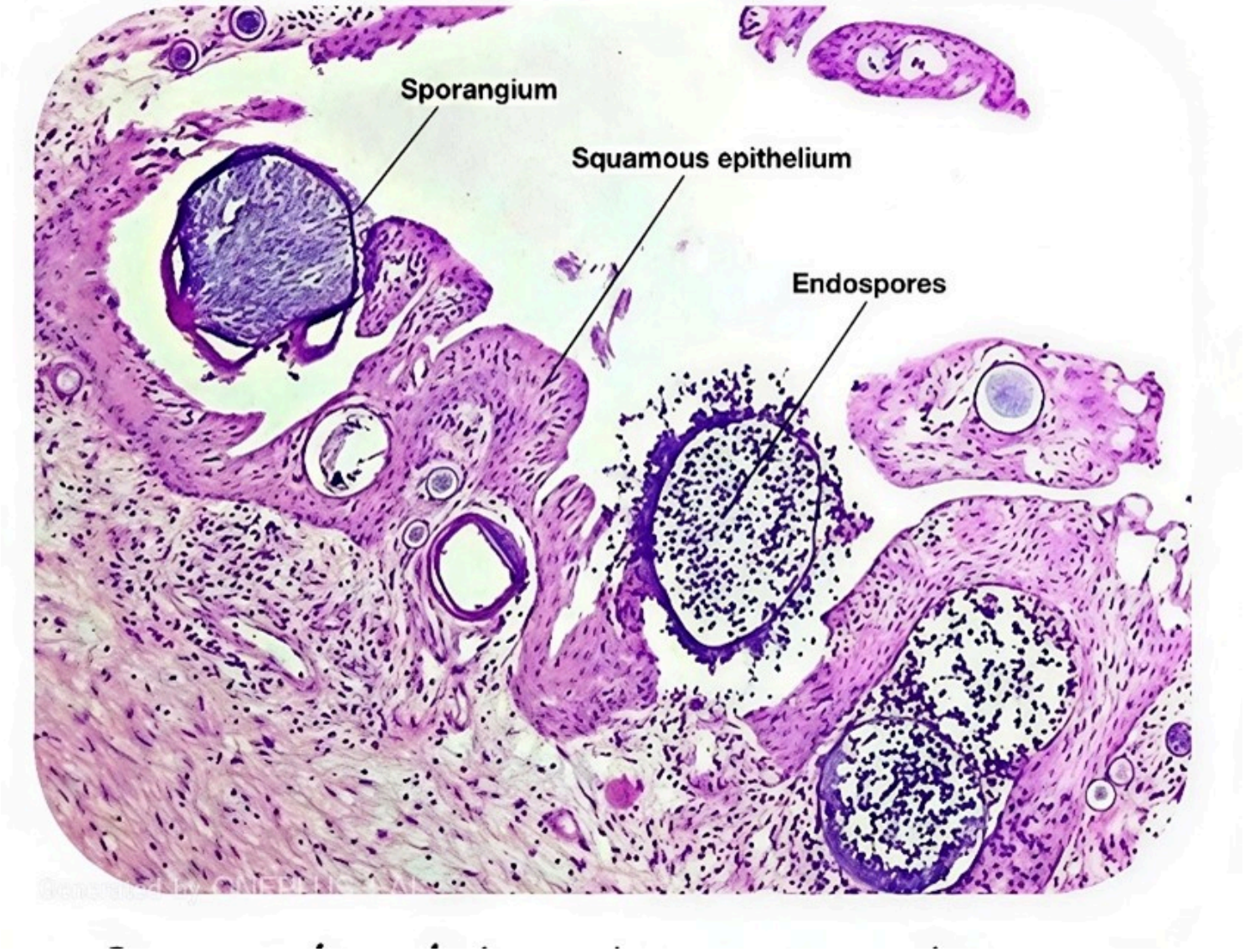


Figure 3

Histological findings of Rhinosporidiosis.

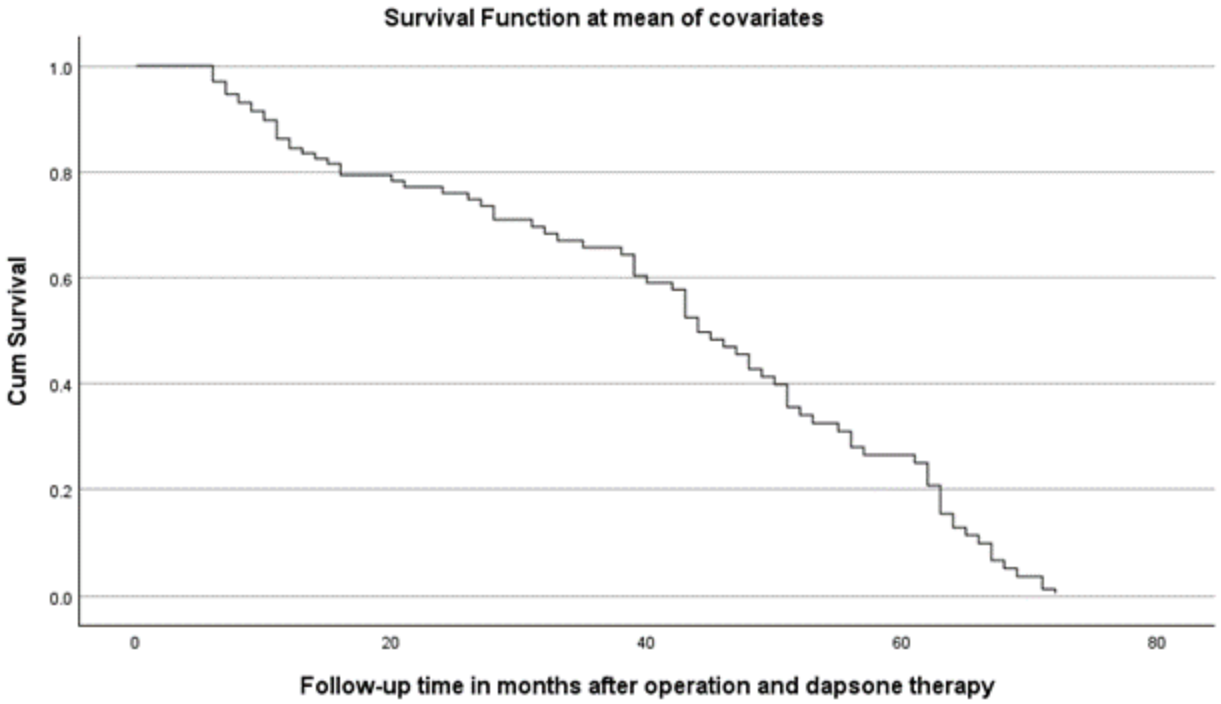


Figure 4

Cox Regression Survival Curve.

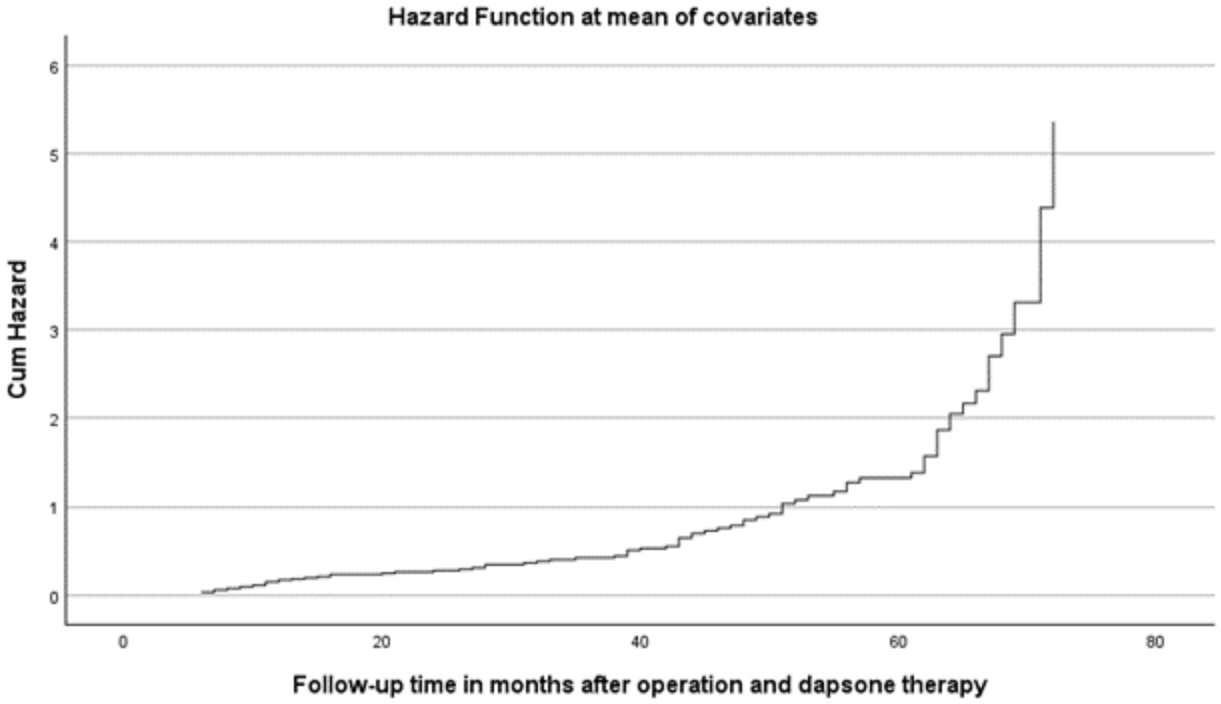


Figure 5

Cox Regression Hazard Curve.

Supplementary Files

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- XiaoYingrhinosporidiosis19sec.mp4
- XiaoYingrhinosporidiosis21sec.mp4