

Objective

Bisoprolol is the second frequently prescribed beta blocker in Germany. However, information on the toxicity of bisoprolol in children and adults is limited. The aim of this study is to provide more data on toxicity and clinical effects of bisoprolol overdose.

Method

Cases of acute bisoprolol overdose in children and adults were analyzed in a retrospective single-center study. Inclusion criteria were the ingestion of single substance, defined dose and documented follow-up for at least 4 hours. Severity of symptoms was assessed according to Poisoning Severity Score.

Results

Patients and Dose

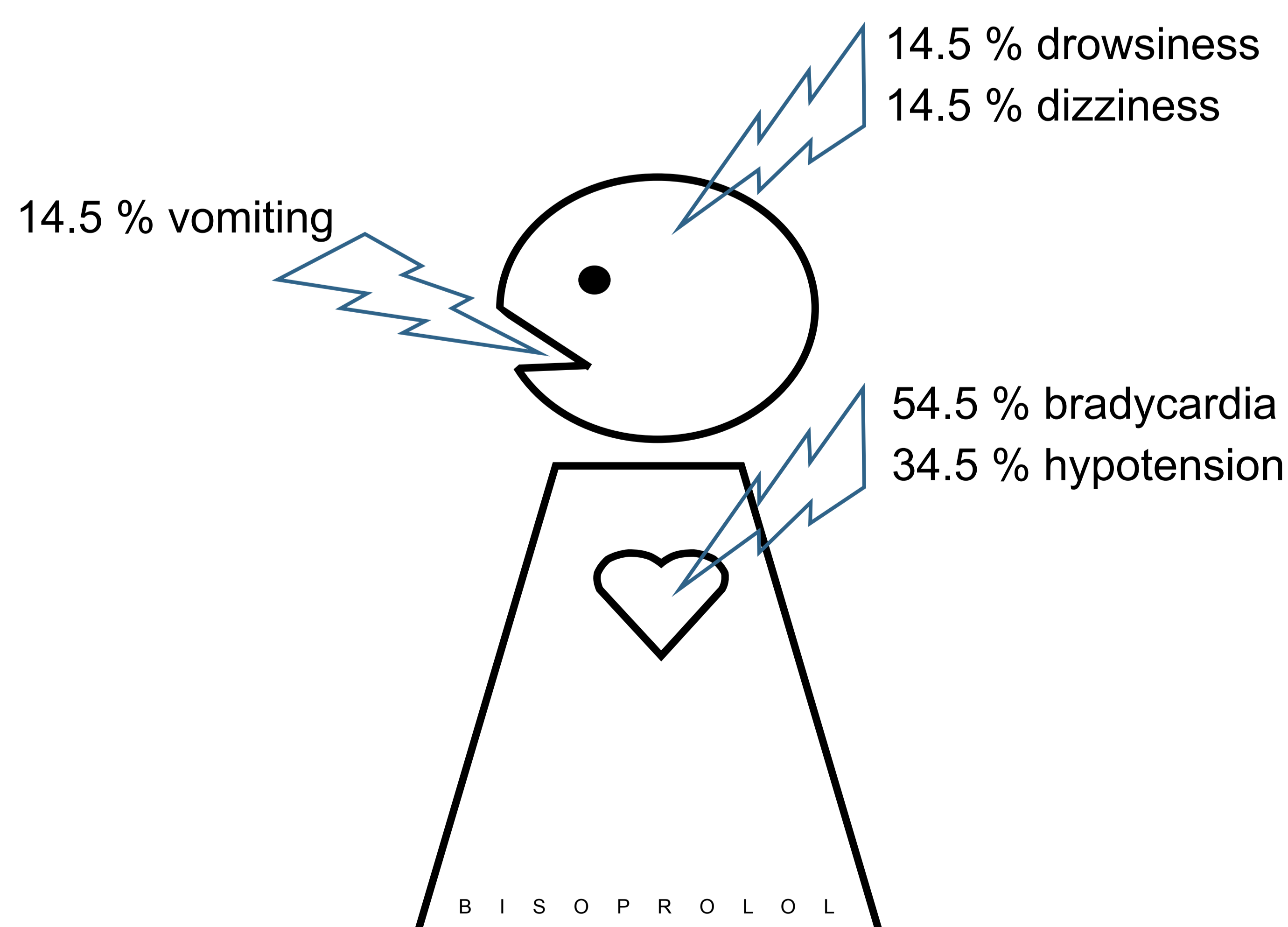
A total of 82 cases met the inclusion criteria. Patients involved were 4 babies (0.4 - 0.58 years), 17 toddlers (1 - 4.5 years), 2 schoolchildren (7 - 13 years), 9 adolescents (14 - 17 years), and 50 adults (18 - 81 years). Doses ranged between 5 - 10 mg (0.63 - 1.43 mg/kg) in babies, 1.25 - 45 mg (0.10 - 3.21 mg/kg) in toddlers, 10 - 50 mg (0.45 - 1.14 mg/kg) in schoolchildren, 10 - 375 mg (0.21 - 7.21 mg/kg) in adolescents and 2.5 - 515 mg (0.04 - 6.94 mg/kg) in adults. (Table 1)

Age Group	Number of Cases	Age (range years)	Dose (range mg)	Dose (range mg/kg)
Baby	4	0.4 - 0.58	5 - 10	0.63 - 1.43
Toddler	17	1 - 4.5	1.25 - 45	0.10 - 3.21
Schoolchild	2	7 - 13	10 - 50	0.45 - 1.14
Adolescent	9	14 - 17	10 - 375	0.21 - 7.21
Adult	50	18 - 81	2.5 - 515	0.04 - 6.94

Table 1: Cases of bisoprolol poisoning in children and adults

Clinical Effects

The following symptoms were frequently observed in intoxication:



Severity of Poisoning

33.0 % of all patients remained asymptomatic, 41.4 % developed mild symptoms. Moderate and severe symptoms occurred in 25.6 % and 1.2 %, respectively. In one isolated case an adolescent developed prolonged hypotension and bradycardia after ingestion of 10 mg. In those age groups showing moderate symptoms, symptoms only occurred from a dose of 50 mg and higher. One patient showed severe symptoms after ingestion of 75 mg. (Table 2)

Age Group	Dose causes symptoms (range mg/kg)			
	PSS: none	PSS: minor	PSS: moderate	PSS: severe
Baby	0.63 - 1.43	-	-	-
Toddler	0.10 - 0.67	1.67 - 3.21	-	-
Schoolchild	-	0.45	1.14	-
Adolescent	-	0.33 - 0.88	0.21 - 7.21	-
Adult	0.13 - 3.57	0.04 - 6.94	0.71 - 6.60	1.07

Table 2: Dose of bisoprolol which causes no, mild, moderate or severe effects in children and adults

Conclusion

Most of bisoprolol overdoses in this study resulted in no or only mild effects (74.4 %). Most frequently observed symptoms were hypotension and bradycardia. The already suggested toxic dose of 0.7 mg/kg can be substantiated by our data [1]. However, it can be assumed that there is a high variability, and you should be aware of individual cases with severe symptoms due to lower doses. Further studies are required in order to be able to comprehensively and conclusively assess the toxicity of bisoprolol, especially in children.

References

1. TOXBASE® [Online]. Available: <https://www.toxbase.org/Chemical-incidents/Miscellaneous/Beta-blockers---toxic-doses2/> Accessed date: 28.10.2021